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Name Ramsey Refai
AU 2154 Examiner # ~~8~~80306
Room # 4C29 Phone 23975
Serial # ~~09~~ 10/052,551

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IEEE INSPEC SPI Other ____________

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What is the topic, novelty, motivation, utility, or other specific details defining the desired focus of this search? Please include the concepts, synonyms, keywords, acronyms, definitions, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract, background, brief summary, pertinent claims and any citations of relevant art you have found.

Claims 1, 6, 26

x copy

Selecting master NODES using an ~~array or~~ distance or availability or any index or number to find A PAIR of MASTER NODES or Just one MASTER NODE AMONG A group or multiple groups

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STIC Searcher Ercom Darron Phone 23520
Date picked up 5/13/05 Date Completed ____________

SIRA Search and Information Resources Administration

```
Set     Items   Description
S1     1074469  NODE? OR HUB OR HUBS OR CPU OR CPUS OR COMPUTER?
S2      760928  WORKSTATION? OR WORK()STATION? OR SERVER? OR DATAPROCESS? -
             OR MICROPROCESS? OR CENTRALPROCESS? OR (DATA OR MICRO OR CENT-
             RAL)()PROCESS?
S3     5173076  MASTER? OR CONTROL? OR COMMAND? OR SUPERVIS? OR MANAGER? OR
              MANAGEMENT? OR LEADER? OR HEAD? OR (TASK? OR JOB OR JOBS OR -
             WORK?)(2N)(ALLOCAT? OR DISTRIB? OR DELEGAT? OR PARCEL? OR MET-
             E?)
S4     3222922  TARGET? OR SELECT? OR CHOSEN? OR SPECIFIC? OR DESIGNAT? OR
             NAMED? OR PARTICULAR?
S5      573868  HAMMING()DISTANC? OR UNCOMMON? OR DISTINGUISH? OR DISTINCT-
             ION? OR DIFFERENCE?
S6       12518  UNALLIE? OR (NON OR "NOT")(2W)(ALLIE? OR OVERLAPPING? OR G-
             ROUP? OR SHARE? OR SHARING? OR COMMON OR PARTICIPAT?)
S7      810742  AVAILAB? OR FREE OR ON()(DECK OR HAND) OR UNOCCUP? OR UNCO-
             MMIT? OR UNDEDICAT?
S8       46004  (NON OR "NOT")(2W)(OCCUP? OR COMMIT? OR DEDICAT? OR USE OR
             BEING()USED)
S9       81870  (PARTICIPAT? OR GROUP? OR CLUB? OR OVERLAP? OR IMBRICAT? OR
              MEMBER? OR (TAKE? OR TAKING)()PART OR PARTAK?)(5N)(INDEX? OR
             INDICES? OR FACTOR? OR VALUE? OR QUOTI? OR QUOTA? OR GUIDE? OR
              SCALE? OR INDICATOR?)
S10     252905  OPTIMAL? OR OPTIMUM? OR SUPERLAT? OR BEST OR MOST()(FAVORA-
             B? OR ADVANTAG?)
S11       2153  MOST()EFFICIENT?
S12    2908318  COMBINAT? OR COLLECT? OR CLUSTER? OR AGGREGAT? OR ACCUMULA-
             T? OR ENSEMBL? OR ASSEMBL? OR GROUP?
S13    1745661  PLURAL? OR MULTIP? OR MULTIT? OR ASSORTMENT? OR ARRAY?
S14    3956244  PAIR? OR 2ND OR SECOND? OR DUAL? OR TWIN OR DOUBL? OR DUPL-
             E? OR TANDEM? OR PARALLEL?
S15    3925524  TWO OR BOTH
S16     474303  NETWORK? OR LAN OR WAN OR ETHERNET? OR INTERNET?
S17      21104  INTRANET? OR ROUTER? OR WORLD()WIDE()WEB
S18    1203146  IC=G06F?
S19      14865  S1:S2(5N)S3 AND S1:S2(5N)S4
S20     103530  S1:S2 AND S3 AND S4 AND S16:S18
S21     109089  S19:S20
S22       1576  S21 AND S14:S15(10N)S1:S2 AND S12:S13(10N)S1:S2
S23        521  S22 AND S19
S24       1576  S22:S23
S25         22  S24 AND S5:S6(10N)S1:S2
S26         64  S24 AND S7:S8(10N)S1:S2
S27          5  S24 AND S9(10N)S1:S2
S28         29  S24 AND S10:S11(10N)S1:S2
S29        112  S25:S28
S30          0  S19 AND S5:S6 AND S7:S8 AND S9 AND S10:S11
S31        112  S29:S30
S32     834081  PR=2001:2005
S33        104  S31 NOT S32
S34        104  IDPAT (sorted in duplicate/non-duplicate order)
? show files
File 347:JAPIO Nov 1976-2005/Jan(Updated 050506)
         (c) 2005 JPO & JAPIO
File 350:Derwent WPIX 1963-2005/UD,UM &UP=200530
         (c) 2005  Thomson Derwent
?
```

34/3,K/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX

016491456 **Image available**
WPI Acc No: 2004-649400/200463
XRPX Acc No: N04-513390

Mobile program network **path optimizing method, involves getting list of** network nodes **to be visited by data string traversing communication** network **, and obtaining ordered list of** nodes **in output of kohonen neural** network

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC)
Inventor: BARILLAUD F
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6785736	B1	20040831	US 2000659639	A	20000912	200463	B

Priority Applications (No Type Date): US 2000659639 A 20000912
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6785736	B1		10	G06F-015/173	

Mobile program network **path optimizing method, involves getting list of** network nodes **to be visited by data string traversing communication** network **, and obtaining ordered list of** nodes **in output of kohonen neural** network

Abstract (Basic):
... The method involves getting a list of **network nodes** to be visited by a data string that traverses a communication **network** . The value of a parameter is obtained from the **pair** of **nodes** , and the path length is computed. A kohonen neural **network** is run by taking bi-directional coordinates as input. An ordered list of **network nodes** representing a shortest path between all the **nodes** is obtained in an output of the neural **network** .
... An INDEPENDENT CLAIM is also included for optimizing a **network** path of mobile programs...

...Used for optimizing a **network** path of mobile programs in a **network management workstation** .
...

...The method dynamically adapts to any change **collected** at the **nodes** to be visited in order and consequently computes the **best** path based on criteria which have been **chosen** when applied to mobile program traveling within the **network** . The method optimizes the travel in a communication **network** in order to automatically obtain an optimized path within the **network** when visiting a predefined list of **network nodes** .
...

...DESCRIPTION OF DRAWING - The drawing shows a flowchart of a method for optimizing the **network** path of mobile programs
...Title Terms: **NETWORK ;**
International Patent Class (Main): **G06F-015/173**

34/3,K/8   (Item 8 from file: 350)
DIALOG(R)File 350:Derwent WPIX

THIS APPLICATION

015536527   **Image available**
WPI Acc No: 2003-598677/200356
XRPX Acc No: N03-476977

Selecting method for master nodes in management of target node group in computer network with multiple nodes and node groups, involves selecting master node **if master** node pair **does not exist for target** node group

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC); IBM CORP (IBMC); CIE IBM FRANCE (IBMC)
Inventor: SAMPATHKUMAR G
Number of Countries: 101 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200361237	A2	20030724	WO 2003EP1209	A	20030107	200356	B
US 20030140108	A1	20030724	US 200252551	A	20020118	200358	
AU 2003235606	A1	20030730	AU 2003235606	A	20030107	200421	
EP 1477008	A2	20041117	EP 2003729492	A	20030107	200475	
			WO 2003EP1209	A	20030107		
KR 2004066785	A	20040727	KR 2004701420	A	20040130	200475	
CN 1557086	A	20041222	CN 2003801059	A	20030107	200522	

Priority Applications (No Type Date): US 200252551 A 20020118
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200361237	A2	E	23	H04L-029/06	

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT SD SE SI SK SL SZ TR TZ UG ZM ZW

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030140108	A1			G06F-015/177	
AU 2003235606	A1			H04L-029/06	Based on patent WO 200361237
EP 1477008	A2	E		H04L-029/06	Based on patent WO 200361237

Designated States (Regional): AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
KR 2004066785	A			G06F-015/16	
CN 1557086	A			H04L-029/06	

... **target node group in computer network with multiple nodes and node groups, involves selecting master** node **if master** node pair **does not exist for target** node group

Abstract (Basic):
...   The method involves finding an **optimal** combination of node pairs, which has a maximum total availability potential for a wide area ...

...a target node group (106). A master node (116), which belongs to the target node **group** , is selected if the master **node** pair does not exist for the target **node group** .
...   b) a **computer** program product; and...

...c) a **master node selecting** system...

...For **selecting** master **nodes** in management of **target node group** in **computer network** with **multiple nodes** and **node groups** . For load balancing in **network clustering** environments...

...Ensures automatic **selection** of **master nodes** to achieve optimal availability of **node group** .
...

...The figure shows the explanatory diagram of **computer network** environment...

... **Target node group** (106...

...Wide area **network** (108...

... **Master node** (116
Title Terms: **SELECT** ;
International Patent Class (Main): **G06F-015/16** ...

... **G06F-015/177**

34/3,K/9 (Item 9 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014649657 **Image available**
WPI Acc No: 2002-470361/200250
XRPX Acc No: N02-371263

Clustered computer **system for online transactions, analyzes write request related to disk drives of** particular server **based on which access condition is determined during forward of request to different** server

Patent Assignee: NCR CORP (NATC)
Inventor: MCDOWELL S R
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6389459	B1	20020514	US 98207934	A	19981209	200250	B

Priority Applications (No Type Date): US 98207934 A 19981209
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6389459	B1		8	G06F-015/167	

Clustered computer **system for online transactions, analyzes write request related to disk drives of** particular server **based on which access condition is determined during forward of request to different** server.

Abstract (Basic):

... The file system mirror drivers in **two servers** (201,203), receive the write requests related to **non - shared** storage spaces of disk drives. The driver of **server** (201) examines the access condition by analyzing requests and forwards the **command** to **server** (203). The diagnosis results are stored in storage of driver in **server** (203).

... 2) Method for mirroring disk volumes over **networked computer** system...

...For online transactions through **computer network** like **LAN** .
...

...Ensures effective mirroring of non-shared disk drives within a **network** by preventing simultaneous access to both drives...

...The figure shows a **clustered computer** system including **non - shared** devices and disk volume mirroring mechanism...

... **Servers** (201,203

...Title Terms: **COMPUTER** ;
International Patent Class (Main): **G06F-015/167**
International Patent Class (Additional): **G06F-012/00**

34/3,K/12 (Item 12 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014139961 **Image available**
WPI Acc No: 2001-624172/200172
Related WPI Acc No: 1999-131539
XRPX Acc No: N01-464996

Communication network **e.g.** server - workstation network , **has switch** controller **to route frame to output port associated with entry in switch route table matching indicia from destination address locator, to another port**

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC)
Inventor: BASILICO A R
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6243360	B1	20010605	US 96715506	A	19960918	200172	B
			US 98157740	A	19980921		

Priority Applications (No Type Date): US 96715506 A 19960918; US 98157740 A 19980921
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6243360	B1		10	H04L-012/56	Div ex application US 96715506
					Div ex patent US 5864535

Communication network **e.g.** server - workstation network , **has switch** controller **to route frame to output port associated with entry in switch route table matching indicia...**

Abstract (Basic):
... A destination address locator generates and records an indicia in frame received through **network** interface card from **workstation** . A switch **controller** correlates indicia in frame with entries in switch route table and routes frame to output...
... b) **Network** switch...

...E.g. **server - workstation network** with dynamic load balancing of messages in **both server** inbound and outbound directions...

...Since if one switch destination port is busy, another port matching **specific** condition accepts the packet and provides connection to the associated **server network** interface card (NIC), the **availability** of any **server** NIC to a **workstation** provides inbound dynamic load balancing, thereby provides full **duplex** traffic load balancing in server - **workstation** environments with improved latency and throughput ...

...The figure shows the flowchart illustrating the data flow for the packet sent from **workstation** to **multiport server** in communication **network** .

...Title Terms: **NETWORK** ;

34/3,K/13 (Item 13 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014094574 **Image available**
WPI Acc No: 2001-578788/200165
Related WPI Acc No: 2000-282620
XRPX Acc No: N01-430702

Server **in wireless** network **system, has digital** controller **which** selects **one of several transmission paths such that faster clients with least amount of traffic are included in** selected **path** .

Patent Assignee: BROWNRIGG E B (BROW-I); WILSON T W (WILS-I)
Inventor: BROWNRIGG E B; WILSON T W
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6249516	B1	20010619	US 96760895	A	19961206	200165	B
			US 2000492930	A	20000127		

Priority Applications (No Type Date): US 96760895 A 19961206; US 2000492930 A 20000127
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6249516	B1		56	H04L-012/66	Div ex application US 96760895
					Div ex patent US 6044062

Server **in wireless** network **system, has digital** controller **which** selects **one of several transmission paths such that faster clients with least amount of traffic are included in** selected **path**

Abstract (Basic):

... A **server** (16) serves as gateway for connecting **two** wireless **networks** (10,12) through **router** (14). Digital **controller** of the **server** which maintains a map of data packet transmission paths of several clients (18A-18C), **selects** a transmission path such that faster clients with least amount of traffic are included in the **selected** path.

... The digital **controller** is coupled to a radio modem and **router** for transferring the data packets between the wireless **networks** . INDEPENDENT CLAIMS are also included for the following...

...For wireless **network** system e.g. **LAN** .

...

...Since each client of the **network** can potentially be in communication with **multiplicity** of other clients and **servers** of the **network** , there are great number of link choices **available** . Thereby the **network** becomes robust and efficient...

...The figure shows the pictorial representation of wireless **network** system...

...Wireless **networks** (10,12...

... **Router** (14...

... **Server** (16

...Title Terms: **NETWORK** ;

34/3,K/14 (Item 14 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014057508 **Image available**
WPI Acc No: 2001-541721/200160
XRPX Acc No: N01-402608

Method for redirecting session in multiple server **computing environment by attempting to obtain connection between first** server **and first station and directing latter to** second server

Patent Assignee: SUN MICROSYSTEMS INC (SUNM)
Inventor: BLOCK R J; HANKO J G; PEACOCK J K
Number of Countries: 095 Number of Patents: 006
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200163403	A2	20010830	WO 2001US5755	A	20010223	200160	B
AU 200141686	A	20010903	AU 200141686	A	20010223	200202	
EP 1257910	A2	20021120	EP 2001912960	A	20010223	200301	
			WO 2001US5755	A	20010223		
US 6658473	B1	20031202	US 2000513655	A	20000225	200379	
EP 1257910	B1	20040121	EP 2001912960	A	20010223	200410	
			WO 2001US5755	A	20010223		
DE 60101841	E	20040226	DE 601841	A	20010223	200419	
			EP 2001912960	A	20010223		
			WO 2001US5755	A	20010223		

Priority Applications (No Type Date): US 2000513655 A 20000225
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200163403	A2	E	56	G06F-009/00	
Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW					
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW					
AU 200141686	A			G06F-009/00	Based on patent WO 200163403
EP 1257910	A2	E		G06F-009/00	Based on patent WO 200163403
Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR					
US 6658473	B1			G06F-015/173	
EP 1257910	B1	E		G06F-009/00	Based on patent WO 200163403
Designated States (Regional): DE FR GB					
DE 60101841	E			G06F-009/00	Based on patent EP 1257910
					Based on patent WO 200163403

Method for redirecting session in multiple server **computing environment by attempting to obtain connection between first** server **and first station and directing latter to** second server

Abstract (Basic):
... The method involves attempting to obtain a connection between a first **server** and a first station. The first station is directed to a **second server** .
... Group **manager** process (601) determines whether the session exists on at least one **server** for a token (809). If a session does not exist, a new session is created on **server** (si) for the token (805). If a session does exist, the **target server selected** is the one with the most recent session **available** for the token (809). The **group manager** process (601) then determines whether the **target server** is the current **server** (811). If the **target server** is not

the current **server** (si), a redirect message is sent to a desk top unit (DTU), telling it to redirect to the **target** **server** (812). If the **target** **server** is the current **server** (si), a transition to step (803) is made...

...In the field of **network** **computer** system...

...Provides more intelligent balancing strategy to achieve **optimal** resources allocation in the complex **multiple** **server** environment...
...The drawing is a flow diagram illustrating of a **server** re-direction in accordance with the present invention...
International Patent Class (Main): **G06F-009/00** ...

... **G06F-015/173**

34/3,K/19 **(Item 19 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

012841133 **Image available**
WPI Acc No: 2000-012965/200001
Related WPI Acc No: 2001-145958; 2001-158109; 2001-463300
XRPX Acc No: N00-010077
File-based operation controller **in minicomputers, desktop** computers , **etc**
Patent Assignee: TEXAS INSTR INC (TEXI)
Inventor: WING SO J L
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5987590	A	19991116	US 97823257	A	19970324	200001	B

Priority Applications (No Type Date): US 97823257 A 19970324
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5987590	A		56	G06F-009/46	

File-based operation controller **in minicomputers, desktop** computers , **etc**

Abstract (Basic):
... A main **CPU** **microprocessor** , a DSP **microprocessor** which has a different instruction set from the main **CPU** **microprocessor** , and a file-based operating unit are arranged so that DSP **microprocessor** can execute main **CPU** operations during time intervals in which the main **CPU** **microprocessor** is too occupied to execute a given function representing virtual hardware.
... The DRAM storing a DSP kernel software is coupled to the main **CPU** **microprocessor** and the DSP **microprocessor** . The file-based operating system in the DRAM, includes software defining handles that **specific** the start and end of a software in a virtual memory. The main **CPU** **microprocessor** defines the locations where source and destination handles are located, based on which DSP kernel software stored in a DRAM defines operations to enable the DSP **microprocessor** to execute a function corresponding to that of the main **CPU** **microprocessor** . If **both** the main **CPU** **microprocessor** and the DSP **microprocessor** are free, either of the **two** **microprocessors** is **selected** to execute the function as defined by the file-based operating system. An INDEPENDENT CLAIM is also included for the operation **controlling** method in **computer** system...

...In minicomputer, desktop **computer** , notebook-size or palm-top **computer** .
...

...Since the DSP **microprocessor** executes the **CPU** **microprocessor** operation when **CPU** **microprocessor** is too occupied, performance of the **computer** system is increased. Also, **multiple** waiting states are avoided and the blazing DSP operating speed does not come to a halt when interfaced to the **CPU** .
...

...The figure shows the block diagram of the **computer** system
...Title Terms: **CONTROL** ;
International Patent Class (Main): **G06F-009/46**
International Patent Class (Additional): **G06F-009/24** ...

... G06F-009/44

34/3,K/20 (Item 20 from file: 350)
DIALOG(R)File 350:Derwent WPIX

011635415 **Image available**
WPI Acc No: 1998-052543/199805
Related WPI Acc No: 1997-119295
XRPX Acc No: N98-041614

Method controlling **communications in user processes executing in multiple instruction - by creating during user process compilation unique** router **process executing on same processing** node **as process, connecting each and its associated** router **process by defining in** node **memory channel between user and associated** router **process**

Patent Assignee: SUPER PC INT LLC (SUPE-N)
Inventor: AGEJEV V M; JABLONKSY S V; JALIN V V; KARATANOV V V; KORNEEV V V; LACIS A O; LEVIN V K; MASSALOVITCH A I; PATRIKEEV A; TITOV A; ZABRODIN A V
Number of Countries: 020 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9748054	A1	19971218	WO 96US11583	A	19960712	199805	B

Priority Applications (No Type Date): US 951072 P 19950712
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9748054	A1	E	94	G06F-013/12	

Designated States (National): BR CN RU
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE

Method controlling **communications in user processes executing in multiple instruction...**

...**by creating during user process compilation unique** router **process executing on same processing** node **as process, connecting each and its associated** router **process by defining in** node **memory channel between user and associated** router **process**

...Abstract (Basic): The method involves creating during compilation of each user process a unique **router** process that will execute on the same processing **node** as the user process. Each user process and its associated **router** process is connected by defining in the memory of the processing **node** a communication channel between the user process and the associated **router** process. For each **router** process an array of N-1 transfer channels is defined in that memory each correlated to the set of transfer links of the **node** .
...

...A routing table (86) is created in that memory unique to the **node** to map a destination **node** number to a **particular** transfer channel. During execution of the user processes messages are passed within the message passing **network** by having a routing process at each **node** to route received messages in response to a destination **node** number contained in a message and the routing table unique to that **node** .
...

...USE - Relates to **parallel** **computer** processing systems and to dead-lock **free** message passing system for **multiple** instruction, **multiple** data **parallel** **computer** processing systems using communicating sequential process programming model...

...for deadlock free message passing as well as ability to support

irregular connection topologies among **nodes** in **computer** system
...Title Terms: **CONTROL** ;
International Patent Class (Main): **G06F-013/12**
International Patent Class (Additional): **G06F-013/14** ...

... **G06F-015/16**

34/3,K/26 (Item 26 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010956018 **Image available**
WPI Acc No: 1996-452968/199645
XRPX Acc No: N96-382087
Port extension method of LAN **- by bonding several sub stations to first and second mediation devices through segment switch which forms exception system unit**
Patent Assignee: AMERICAN TELEPHONE & TELEGRAPH CO (AMTT); LUCENT TECHNOLOGIES INC (LUCE)
Inventor: JOH C C
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 8228201	A	19960903	JP 95326270	A	19951122	199645	B
US 5621893	A	19970415	US 94343290	A	19941122	199721	

Priority Applications (No Type Date): US 94343290 A 19941122
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 8228201	A		11	H04L-012/44	
US 5621893	A		11	G06F-013/00	

Port extension method of LAN **-**

...Abstract (Basic): 42f). A first and second mediation devices (24,26) transmit a packet through an access **controller** to the first and second segment memory buses based on an internal protocol...

...The first and second mediation devices are **selectively** related to several sub stations. The sub stations are connected to the first and second...

...ADVANTAGE - Increases number of ports which can be used for extensive **LAN** .

...Abstract (Equivalent): A method for expanding the number of ports **available** to a local area **hub network** including a **plurality** of **hubs** coupled along a common memory bus, wherein said **hubs** must be granted **controlling** access to said memory bus before transmitting packets on the memory bus, comprising the steps...

...providing a **plurality** of **hubs** ;
...

...providing a first segment arbiter means for granting a **hub controlling** access to a first segment memory bus for transmission of a packet on said first...

...providing a **second** segment arbiter means for granting a **hub controlling** access to a **second** segment memory bus for transmission of a packet on said second segment memory bus based...

...coupling said **plurality** of **hubs** to said first segment arbiter means and said **second** segment arbiter means via a segment switch, wherein said segment switch **selectively** associates said **plurality** of said **hubs** with said first segment arbiter means and said **second** segment arbiter means to form separate and distinct system units
...Title Terms: **LAN** ;
International Patent Class (Main): **G06F-013/00** ...

34/3,K/27 (Item 27 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010952143 **Image available**
WPI Acc No: 1996-449093/199645
XRPX Acc No: N96-378658
Local area hub network **for** computer **communication - provides** control **access to memory bus by mediation unit which functions as temporary** hub **station based on internal protocol**
Patent Assignee: AMERICAN TELEPHONE & TELEGRAPH CO (AMTT); LUCENT TECHNOLOGIES INC (LUCE)
Inventor: JOH C C
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 8223196	A	19960830	JP 95326271	A	19951122	199645	B
US 5666488	A	19970909	US 94343286	A	19941122	199742	

Priority Applications (No Type Date): US 94343286 A 19941122
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 8223196	A		14	H04L-012/40	
US 5666488	A		10	G06F-013/00	

Local area hub network **for** computer **communication...**

...**provides** control **access to memory bus by mediation unit which functions as temporary** hub **station based on internal protocol**

...Abstract (Basic): The **network** involves connecting a memory bus (28) with **multiple hub** stations (16,18,20). Each **hub** station carries out an interface with a remote terminal (10). A mediation device (32) to each **hub** station. The mediation device provides a **control** access to the memory bus so that a packet is transmitted to a certain **hub** station based on the demand from the **specific hub** stations...

...Based on an internal protocol, the mediation device functions as the temporary **hub** station and provides a **control** access to the memory bus...
...Abstract (Equivalent): A method for expanding the number of ports **available** to a local area **hub network** including a **plurality** of **hubs** connected along a memory bus, wherein said **hubs** must be granted **controlling** access to said memory bus before transmitting packets on said memory bus, comprising the steps...

...coupling a first branch arbiter to a first set of **hubs** , said first branch arbiter **designates** a **hub** , based upon internal protocols, temporary bus **master hub** by granting said temporary bus **master hub controlling** access to the common memory bus for transmission of a packet on said memory bus...

...coupling a **second** branch arbiter to a **second** set of **hubs** , said **second** branch arbiter **designates** a **hub** , based upon internal protocols, temporary bus **master hub** by granting said temporary bus **master hub controlling** access to the common memory bus for transmission of a packet on said memory bus...

...internal protocols, requests made by said first branch arbiter and said second branch arbiter for **controlling** access to said memory bus...

...wherein said first branch arbiter may only grant a **hub** **controlling** access to said memory bus when said root arbiter has granted a request of said first branch arbiter for **controlling** access to said memory bus and said **second** branch arbiter may only grant a **hub** **controlling** access to said memory bus when said root arbiter has granted a request of said second branch arbiter for **controlling** access to said memory bus...

...Title Terms: **HUB** ;

International Patent Class (Main): **G06F-013/00** ...

34/3,K/28   (Item 28 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010937158   **Image available**
WPI Acc No: 1996-434108/199643
XRPX Acc No: N96-365718

High speed network **switch for supporting** node **-to-** node **communications - has transceivers having transmit and receive connections via port links to** nodes **and connection status detectors, and bus arbitration device responsive to service requests**

Patent Assignee: FINISAR CORP (FINI-N)
Inventor: FARLEY M J; LEUNG C P; LEVINSON F H; VU M Q
Number of Countries: 021 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9628917	A1	19960919	WO 96US3149	A	19960306	199643	B
US 5566171	A	19961015	US 95404873	A	19950315	199647	
AU 9653042	A	19961002	AU 9653042	A	19960306	199703	
US 5604735	A	19970218	US 95404873	A	19950315	199713	
			US 95440088	A	19950512		

Priority Applications (No Type Date): US 95440088 A 19950512; US 95404873 A 19950315

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9628917	A1	E	64	H04L-012/56	
Designated States (National): AU CA JP					
Designated States (Regional): AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE					
US 5566171	A		32	H04L-012/56	
AU 9653042	A			H04L-012/56	Based on patent WO 9628917
US 5604735	A		31	H04Q-011/04	CIP of application US 95404873
					CIP of patent US 5566171

High speed network **switch for supporting** node **-to-** node **communications...**

...**has transceivers having transmit and receive connections via port links to** nodes **and connection status detectors, and bus arbitration device responsive to service requests**

...Abstract (Basic): the **network** switch has a number of transceivers which interface directly with a similar number of **nodes** . Each transceiver has a receive and a transmit through port for passing data to and from the **nodes** , the data including an encoded connect sequence, a first wait sequence and user data. An...

...A switch **controller** establishes and prioritises matrix connections and disconnections. The switch **controller** decodes the connect sequence and schedules the switching device connections. A requesting **node** sequentially transmits the encoded connect sequence followed by user data to the **network** switch assuming that **node** -to- **node** communication has been established with a destination **node** . The isolation device loops the user data back to the requesting **node** when the destination **node** is not **available** . The encoded connect sequence incudes routing information...

...ADVANTAGE - Minimises **network** latency, and directly switches available resources while also allowing for user to queue routing request

...Abstract (Equivalent): A high speed **network** switch, comprising...

...a **plurality** of transceivers for interfacing directly with a like **plurality** of **user** **nodes** , each of said transceivers having a receive and transmit through port for passing data to and from **said** user **nodes** and said **network** switch, said data comprising a connect sequence, a first wait sequence, a routing packet, a...

... a **controller** for establishing and prioritizing matrix connections and disconnections, decoding said routing packet **and** scheduling said switching means connections, such that a requesting **node** sequentially transmits said **connect** sequence, routing **packet** and **user** data to said **network** switch assuming **node - to - node** communication will be established with a **target** **node** , said isolation **means** looping said user **data** back to said requesting **node** when said **target** **node** is unavailable...

... A high speed **network** switch comprising...

...a **plurality** **of** transceivers for interfacing directly with a like **plurality** of **nodes** , **each** of said transceivers having a receive and transmit **through** port for **passing** data to and from said **nodes** , said **data** comprising an **encoded** connect sequence, a first **wait** sequence, and user data...

...a **controller** **for** establishing and prioritizing matrix connections and disconnections, said **controller** decoding **said** connect sequence and scheduling said switching means connections, such that a **requesting** **node** sequentially transmits said encoded connect sequence followed by said **user** data **to** said **network** **switch** assuming **node** -to- **node** communication has been **established** **with** **a** **destination** **node** , **said** isolation means looping said user data **back** **to** **said** requesting **node** **when** **said** destination **node** is unavailable.

...Title Terms: **NETWORK** ;

34/3,K/31 (Item 31 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010742822 **Image available**
WPI Acc No: 1996-239777/199624
XRPX Acc No: N96-200672
Dynamically controlled **routing in telecommunication** network **- using at least one virtual destination** node **which is logical entity corresp. to** group **of** two **or more** network **elements**
Patent Assignee: NORTEL NETWORKS LTD (NELE); NORTHERN TELECOM LTD (NELE); NORTEL NETWORKS CORP (NELE); BEDARD F (BEDA-I); CARON F (CARO-I); REGNIER J (REGN-I)
Inventor: BEDARD F; CARON F; REGNIER J
Number of Countries: 019 Number of Patents: 008
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9613945	A1	19960509	WO 95CA600	A	19951026	199624	B
US 5526414	A	19960611	US 94329716	A	19941026	199629	
EP 789974	A1	19970820	EP 95944816	A	19951026	199738	
			WO 95CA600	A	19951026		
JP 11506571	W	19990608	WO 95CA600	A	19951026	199933	
			JP 96514203	A	19951026		
US 6091720	A	20000718	US 94329716	A	19941026	200037	
			WO 95CA600	A	19951026		
			US 97817786	A	19970424		
CA 2203534	C	20010828	CA 2203534	A	19951026	200154	
			WO 95CA600	A	19951026		
EP 789974	B1	20011121	EP 95944816	A	19951026	200176	
			WO 95CA600	A	19951026		
DE 69524119	E	20020103	DE 624119	A	19951026	200210	
			EP 95944816	A	19951026		
			WO 95CA600	A	19951026		

RELATED DOX BENEATH

Priority Applications (No Type Date): US 94329716 A 19941026; US 97817786 A 19970424
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9613945	A1	E	61	H04Q-003/66	
Designated States (National): CA JP US					
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE					
US 5526414	A		11	H04M-007/00	
EP 789974	A1	E			Based on patent WO 9613945
Designated States (Regional): DE FR GB					
JP 11506571	W		67	H04M-003/00	Based on patent WO 9613945
US 6091720	A			H04L-012/28	Cont of application US 94329716
					Cont of patent US 5526414
					Based on patent WO 9613945
CA 2203534	C	E		H04Q-003/66	Based on patent WO 9613945
EP 789974	B1	E		H04Q-003/66	Based on patent WO 9613945
Designated States (Regional): DE FR GB					
DE 69524119	E			H04Q-003/66	Based on patent EP 789974
					Based on patent WO 9613945

Dynamically controlled **routing in telecommunication** network - ...

...**using at least one virtual destination** node **which is logical entity corresp. to** group **of** two **or more** network **elements**

...Abstract (Basic): The telecommunications **network** (31A) has several

network **nodes** and links. The **nodes** include origin **nodes** with a switching element for routing calls, destination **nodes** and transit **nodes** which are **both** origin and destination **nodes** . A link connects each origin and destination **node** . Each switching element has a memory holding a listing of destination **nodes** , a corresponding link where it exists, a corresponding **group** of one or more circuit groups outgoing from the switching element and a list of zero or more transit **nodes** . Each switching element translates address data of a call to determine a destination **node** .

...

...The listing of destination **nodes** of at least one of the switching elements has a virtual destination **node** representing a **group** of **two** or more components, each being a distinct physical **network** element. There is one or more distinct circuit groups associated with each component. The link from the one of the origin **nodes** to the virtual destination is a set of circuit groups from the switching element at that one of the origin **nodes** to the **two** or more components of the virtual destination **node** .

...

...USE/ADVANTAGE - Telephone **networks** . Allows current routing schedule to effectively use other **network** elements. Can be used with **networks** which do not have dynamic routing

...Abstract (Equivalent): A telecommunications **network** comprising...

...a **plurality** of **network** **nodes** and links...

...the **network** **nodes** comprising origin **nodes** , each comprising a switching element capable of routing calls within the **network** , and destination **nodes** serving as destinations for such calls, some of said **network** **nodes** being **tandem** **nodes** , each **tandem** **node** serving as **both** a destination **node** and an origin **node** ;

...

...each link interconnecting directly an origin **node** and a destination **node** and comprising one or more circuit **groups** ,

...

...having storage means for routing information, the routing information comprising (i) a listing of destination **nodes** ; (ii) associated with each destination **node** , a corresponding link, where such a link exists; (iii) for each link, a corresponding group...

...or more circuit groups outgoing from the switching element; and (iv) associated with each destination **node** , a list of zero or more **tandem** **nodes** ;

...

...the **network** further comprising means for updating the routing information...

...switching element comprising means for translating address data of a call to determine a destination **node** for the call and...

...i) where a link to the destination **node** exists, attempting to route the call to the destination **node** via a circuit **group** that is in the link...

...ii) where a link to the destination **node** is not **available** , accessing

its routing table to **select** a **tandem** **node** and attempting to route the call via a link to the **tandem** **node** ;

...

...wherein said listing of destination **nodes** of at least one of said switching elements comprises a virtual destination **node** representing a **group** of **two** or more components, each component being a distinct physical **network** element, there being one or more distinct circuit groups associated with each component, and each link from a **particular** origin **node** to the virtual destination **node** is a set of circuit **groups** from the switching element at that **particular** origin **node** to the **two** or more components of the virtual destination **node** .

...Title Terms: **CONTROL** ;
...International Patent Class (Additional): **G06F-011/00**

US006091720A

United States Patent [19]

Bédard et al.

[11] **Patent Number: 6,091,720**

[45] **Date of Patent: Jul. 18, 2000**

[54] **DYNAMICALLY CONTROLLED ROUTING USING DYNAMIC MANAGEMENT OF INTRA-LINK TRAFFIC TO VIRTUAL DESTINATION NODES**

[75] Inventors: **François Bédard**, Verdun; **Jean Régnier**, Laval; **France Caron**, Verdun, all of Canada

[73] Assignee: **Nortel Networks Corporation**, Montreal, Canada

[21] Appl. No.: **08/817,786**

[22] PCT Filed: **Oct. 26, 1995**

[86] PCT No.: **PCT/CA95/00600**

§ 371 Date: **Apr. 24, 1997**

§ 102(e) Date: **Apr. 24, 1997**

[87] PCT Pub. No.: **WO96/13945**

PCT Pub. Date: **May 9, 1996**

Related U.S. Application Data

[63] Continuation of application No. 08/329,716, Oct. 26, 1994, Pat. No. 5,526,414.

[51] **Int. Cl.^{7}** **H04L 12/28**; H04L 12/50; G01R 31/08; G06F 11/00

[52] **U.S. Cl.** **370/351**; 370/351; 370/357; 370/238; 370/254; 379/221; 379/224; 379/225

[58] **Field of Search** 370/238, 254, 370/255, 357, 400, 401, 389, 392, 396, 397; 379/221, 224, 225, 220, 207

[56] **References Cited**

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0 538 853	4/1993	European Pat. Off.	H04Q 3/00

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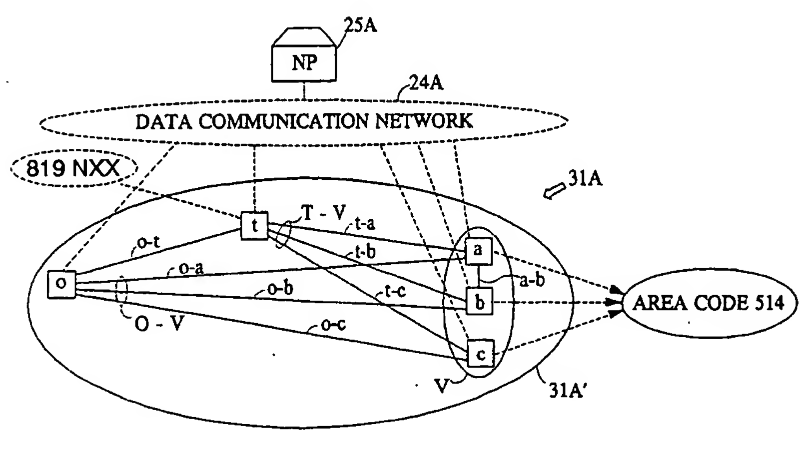
(List continued on next page.)

Primary Examiner—Michael Horabik
Assistant Examiner—Man Phan
Attorney, Agent, or Firm—Thomas Adams

[57] **ABSTRACT**

A DCR telecommunications network comprises a plurality of network switching elements interconnected by circuit groups for carrying calls, and a network processor communicating with the network elements. If it cannot use a direct route to a neighbouring network element, the switching element may access a routing table containing alternate routes which are updated periodically by the network controller. The network functions as a group of nodes interconnected by links. Routing takes place on a node-to-node basis. At least one of the nodes is a virtual destination node, vis. a logical entity corresponding to a group of two or more components which are network elements. A link to the virtual destination node is a set of circuit groups connecting to its components. Final destinations outside the network can be associated with the virtual destination node as an intermediate destination node, thereby allowing a call to exit the DCR network via any of the components rather than via only one Unique Exit Gateway. Where a link to the virtual destination node comprises a plurality of circuit groups, the associated switching element stores proportions for those circuit groups. When attempting to route a call via the link to the virtual destination node, the switching element attempts the circuit groups in dependence upon the proportions. The proportions may be fixed, i.e. computed off-line and stored. Alternatively, the proportions may be updated by the network processor based upon call completion information it receives periodically from the switching elements.

30 Claims, 5 Drawing Sheets



US005526414A

United States Patent [19]

Bédard et al.

[11] Patent Number: 5,526,414

[45] Date of Patent: Jun. 11, 1996

[54] DYNAMICALLY CONTROLLED ROUTING USING VIRTUAL NODES

[75] Inventors: **Francois Bédard**, Verdun; **Jean Régnier**, Laval; **France Caron**, Verdun, all of Canada

[73] Assignee: **Northern Telecom Limited**, Montreal, Canada

[21] Appl. No.: **329,716**

[22] Filed: **Oct. 26, 1994**

[51] **Int. Cl.**[6] **H04M 7/00**; H04M 3/42; H04J 3/24

[52] **U.S. Cl.** **379/221**; 370/94.1; 379/207; 379/220; 379/224; 379/225

[58] **Field of Search** 379/207, 219, 379/220, 221, 224, 225; 370/94.1

[56] **References Cited**

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4,284,852	8/1981	Szybicki et al.	379/221
4,669,113	5/1987	Ash et al.	379/221
4,788,721	11/1988	Krishnan et al.	379/221
5,297,137	3/1994	Ofek et al.	370/94.1 X
5,377,262	12/1994	Bales et al.	379/221

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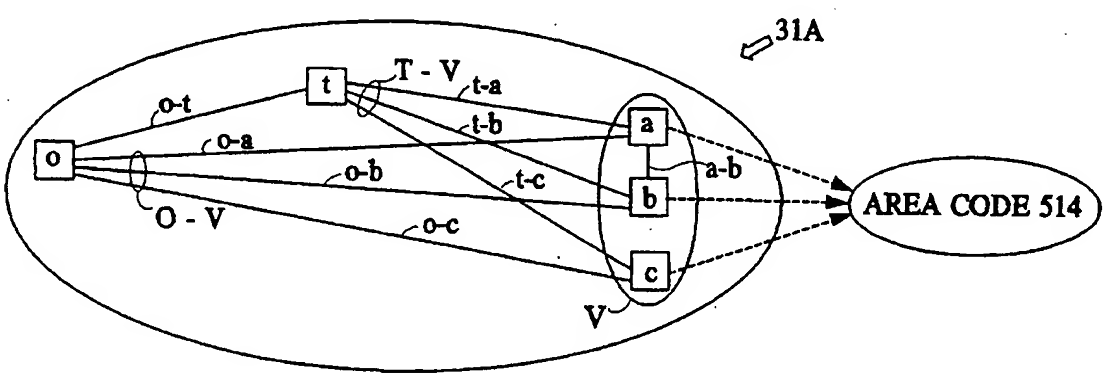
Servicing and Real-Time Control of Networks With Dynamic Routing, by G. R. Ash, A. H. Kafker and K. R. Krishnan, The Bell System Technical Journal vol. 60, No. 8, Oct. 1981 pp. 1821–1845.

Primary Examiner—Jeffery Hofsass
Assistant Examiner—Harry S. Hong
Attorney, Agent, or Firm—Thomas Adams

[57] ABSTRACT

A dynamically controlled routing (DCR) telecommunications network is formed by a plurality of network switching elements, each connected to at least one other by at least one circuit group for carrying calls therebetween, and a network processor connected to the network elements by data links. Each network switching element determines, for each call, a neighboring network element to which it should be routed. It does so by accessing a routing table which contains alternate routes to be attempted if a direct route either does not exist or cannot be used. The routing tables are updated periodically by the network controller. The DCR network functions as a group of nodes interconnected by links and routing takes place on a node-to-node basis. At least one of the nodes is a logical entity which does not necessarily have a direct correspondence to a single physical network element but rather corresponds to a group of at least one physical component which may be a network element, a part of a network element, or a plurality of network elements or parts thereof. Likewise, a link to the virtual node does not necessarily correspond to a circuit group but comprises the set of direct circuit groups connecting to the components of the virtual node. DCR networks employing virtual nodes have increased flexibility. For example, final destinations outside the DCR network can be associated with the virtual node ifs an intermediate destination node, thereby allowing a call to exit the DCR network via any of the components of the virtual node rather than via only one Unique Exit Gateway.

6 Claims, 3 Drawing Sheets



34/3,K/34 (Item 34 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010545799 **Image available**
WPI Acc No: 1996-042752/199605
XRPX Acc No: N96-035773

Microsequencer bus controller **subsystem for special VLSI gate** array **of RISC** computer **system -** controls **two segments of station** group **connected with bus through** master **and slave** microprocessors

Patent Assignee: UNISYS CORP (BURS)
Inventor: BYERS L L; DE SUBIJANA J M; MICHAELSON W A
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 7281914	A	19951027	JP 94319558	A	19941222	199605	B
US 5535405	A	19960709	US 93172657	A	19931223	199633	

Priority Applications (No Type Date): US 93172657 A 19931223
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 7281914	A		35	G06F-011/16	
US 5535405	A		52	G06F-015/00	

Microsequencer bus controller **subsystem for special VLSI gate** array **of RISC** computer **system...**

... controls **two segments of station** group **connected with bus through** master **and slave** microprocessors

...Abstract (Basic): The microsequencer bus **controller** subsystem includes a **master microprocessor** (220). A memory contains fixed length instruction. The instruction is concurrently executed by the **master** and slave **microprocessors** (220,222). A number of stations are interfaced to the buses. The **master microprocessor** detects the **difference** by comparing the results of the **two** processors...

...Abstract (Equivalent): In a **computer** system having a **plurality** of different classes of digital **data processing** subsystems arranged for performing differing functions, one of the digital **data processing** subsystems being a microsequencer bus **controller** subsystem, the microsequencer bus **controller** subsystem comprising...

...a **control** store including addressable memory wherein predetermined instructions are stored...

...first and **second microprocessors** coupled to said **control** store, said first and **second microprocessors** functioning to simultaneously execute in **parallel** said predetermined instructions fetched from said **control** store, said first **microprocessor** producing a first result from executing each of said predetermined instructions and said **second microprocessor** producing a **second** result from executing each of predetermined instructions...

...error detection circuitry to compare said first result of said first **microprocessor** 's execution of each of said predetermined instructions with said **second** result of said **second microprocessor** 's execution of each of said predetermined instructions to detect an error occurring during the execution of each of said predetermined instructions by either said first **microprocessor** or said **second microprocessor** ;
...

...a bi-directional bus connected to said first and **second**

microprocessors , said bi-directional bus transferring data signals in either a first **selected** size of data words or a second **selected** size of data words, said first **selected** size of data words modulo said second **selected** size of data words being non-zero; and...

...a plurality of independent processing units connected to said bi-directional bus and to the **plurality** of digital **data processing** subsystems, each of said **plurality** of independent processing units **selectively** performing predetermined functions including transferring data between said independent processing units and transferring data between said independent processing units and the **plurality** of digital **data processing** subsystems, wherein a first predetermined number of said independent processing units is **controlled** by said first **microprocessor** and a **second** predetermined number of said independent processing units is **controlled** by said **second microprocessor** .

...Title Terms: **CONTROL** ;
International Patent Class (Main): **G06F-011/16** ...

... **G06F-015/00**

34/3,K/35 (Item 35 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010419425 **Image available**
WPI Acc No: 1995-320740/199541
Related WPI Acc No: 2001-624560
XRPX Acc No: N95-241259
Access control **protocol for frequency-hopping communication system - assigns hierarchical designation to each** node **, synchronises initially to first** node **, searching and synchronising to** second node **if found**
Patent Assignee: PROXIM INC (PROX-N)
Inventor: COLEMAN A; GRAU J; HONG H; GILES R R
Number of Countries: 063 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9524081	A1	19950908	WO 95US2542	A	19950302	199541	B
AU 9519747	A	19950918	AU 9519747	A	19950302	199551	
EP 748540	A1	19961218	EP 95912662	A	19950302	199704	
			WO 95US2542	A	19950302		
EP 748540	A4	19971029	EP 95912662	A	19950302	199840	
US 6466608	B1	20021015	US 94205155	A	19940303	200271	
			US 95417907	A	19950406		

Priority Applications (No Type Date): US 94205155 A 19940303; US 95417907 A 19950406
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9524081	A1	E	51	H04B-001/713	

Designated States (National): AM AT AU BB BG BR BY CA CH CN CZ DE DK EE ES FI GB GE HU JP KE KG KP KR KZ LK LR LT LU LV MD MG MN MW MX NL NO NZ PL PT RO RU SD SE SG SI SK TJ TT UA UZ VN
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT KE LU MC MW NL OA PT SD SE SZ UG

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
AU 9519747	A			H04B-001/713	Based on patent WO 9524081
EP 748540	A1	E	51	H04B-001/713	Based on patent WO 9524081

Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 748540	A4			H04B-001/713	
US 6466608	B1			H04L-027/30	Cont of application US 94205155

Access control **protocol for frequency-hopping communication system...**

...**assigns hierarchical designation to each** node **, synchronises initially to first** node **, searching and synchronising to** second node **if found**

...Abstract (Basic): In a wireless communication system (100) contg. **plural nodes** (102,104,106,108,110,112,114) e.g. in a local area **network** , frequency-hopping **control** is provided amongst the **nodes** . The protocol used decentralises sync. **control** among the **nodes** . Any one **node** being used as **master** to **control** the system may switch to another **node** which then acts as **master** .
...

...Each **node** is assigned a hierarchical **designation** of priority for **controlling** system synchronisation. A sync. signal is transmitted from a first **node** during a predetermined contention- **free** sync. period, with synchronised frequency-hopping of at least a **second node** to the first **node** via the sync. signal...

...USE/ADVANTAGE - For establishing and maintaining synchronisation among **plural** **nodes** in wireless communication system, where **nodes** move into and out of dynamically changing, reconfigurable sub-systems, each having independently synchronised frequency

...Title Terms: **CONTROL** ;

34/3,K/38 (Item 38 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010329939 **Image available**
WPI Acc No: 1995-231782/199530
XRPX Acc No: N95-180713

Data file processing at remote workstation **- compressing and collecting data files into** groups **on local area** network **at central location for transfer to** workstation **over ISDN** network

Patent Assignee: EMPIRE BLUE CROSS/BLUE SHIELD (EMPI-N); REMOTE SYSTEMS CO LLC (REMO-N); SIGMA IMAGING SYSTEMS INC (SIGM-N); REMOTE SYSTEMS CO LCC (REMO-N); WANG SOFTWARE NY INC (WANG)
Inventor: STRATIGOS W N; YIEN R S
Number of Countries: 025 Number of Patents: 008
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9517067	A1	19950622	WO 94US14785	A	19941219	199530	B
US 5446740	A	19950829	US 93169327	A	19931217	199540	
AU 9514063	A	19950703	AU 9514063	A	19941219	199542	
EP 734626	A1	19961002	WO 94US14785	A	19941219	199644	
			EP 95905454	A	19941219		
US 5568489	A	19961022	US 93169327	A	19931217	199648	
			US 95424152	A	19950417		
US 5724574	A	19980303	US 93169327	A	19931217	199816	
			US 95424152	A	19950417		
			US 96630042	A	19960402		
AU 689839	B	19980409	AU 9514063	A	19941219	199827	
JP 2002515143	W	20020521	WO 94US14785	A	19941219	200236	
			JP 95517025	A	19941219		

Priority Applications (No Type Date): US 93169327 A 19931217; US 95424152 A 19950417; US 96630042 A 19960402
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9517067	A1	E	39	H04L-029/06	
Designated States (National): AU BR CA FI JP KR NO US					
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE					
US 5446740	A		15	G06F-015/00	
AU 9514063	A			H04L-029/06	Based on patent WO 9517067
EP 734626	A1	E	39	H04L-029/06	Based on patent WO 9517067
Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE					
US 5568489	A		12	G06F-015/00	Cont of application US 93169327
					Cont of patent US 5446740
US 5724574	A		11	G06F-015/00	Cont of application US 93169327
					Cont of application US 95424152
					Cont of patent US 5446740
					Cont of patent US 5568489
AU 689839	B			H04L-029/06	Previous Publ. patent AU 9514063
					Based on patent WO 9517067
JP 2002515143	W		30	G06F-013/00	Based on patent WO 9517067

Data file processing at remote workstation - ...

...**compressing and collecting data files into** groups **on local area** network **at central location for transfer to** workstation **over ISDN** network

...Abstract (Basic): data into compressed data files at a central location.

A group of the files is **selected** according to predetermined criteria and transferred from the central location to a remote **workstation** .

...

...The **group** of compressed files is received in digital form at the **workstation** and at least some of them are stored there. One of the files is decompressed...

...ADVANTAGE - Electronic storage of multi-media items. Improves efficiency of document data assignment, transmission and **collection** to and from **workstations** , whilst maintaining **optimum** performance

...Abstract (Equivalent): data into compressed data files at a central location. A group of the files is **selected** according to predetermined criteria and transferred from the central location to a remote **workstation** .

...

...The **group** of compressed files is received in digital form at the **workstation** and at least some of them are stored there. One of the files is decompressed...

...ADVANTAGE - Electronic storage of multi-media items. Improves efficiency of document data assignment, transmission and **collection** to and from **workstations** , whilst maintaining **optimum** performance...

...A method of remotely processing data arranged into digital data files at a remote **workstation** over telephone lines, comprising the steps of...

... **selecting** , according to first predetermined criteria, a group of said compressed data files...

...transferring said group of compressed data files from said central location to the remote **workstation** ;

...

...receiving the **group** of compressed data files in digital form at the remote **workstation** and storing at least some of said compressed data files at the remote **workstation** ;

...

...decompressing a first of said compressed data files in the **group** at the remote **workstation** , based on **second** predetermined criteria, while receiving and storing other compressed data files; and...

...decompressing a second of said compressed data files in the **group** at the remote **workstation** , based on the **second** predetermined criteria, while the first uncompressed file is **available** for a user at the remote **workstation** to perform work related to it...

...At a remote **workstation** data files are compressed and **collected** into **groups** on a local area **network** at a central location. The files of a **group** are transferred to the **workstation** over an ISDN switched telephone **network** in response to an automatic requests from the **workstations** . The **workstation** requests depend on the inventory of unprocessed files at the **workstation** as well as the time and date, in order to reduce the connection time...

...When files are received at the **workstation** , the first is immediately decompressed and presented to the operator. In the meantime, the next

...

...cost of transmission over switched communications medium. Minimises worker idle time to maximise productivity. Simplifies **management** of remote **workstations** .

...Title Terms: **NETWORK** ;
International Patent Class (Main): **G06F-013/00** ...

... **G06F-015/00**
International Patent Class (Additional): **G06F-012/00** ...

34/3,K/42 (Item 42 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010231106 **Image available**
WPI Acc No: 1995-132363/199518
XRPX Acc No: N95-104156

Speeding up path selection **in packet switching** network **- using** network **access** node **for packet switching communication** network **with several** nodes **interconnected with transmission links which receive and transmit data packets**

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC); IBM CORP (IBMC)
Inventor: ALFONSI J; GALAND C; LEBIZAY G; MAUREL O
Number of Countries: 006 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 637152	A1	19950201	EP 93480104	A	19930730	199518	B
CA 2123449	A	19950131	CA 2123449	A	19940512	199518	
JP 7066835	A	19950310	JP 94155599	A	19940707	199519	
US 5491690	A	19960213	US 94279373	A	19940722	199612	
CA 2123449	C	19990216	CA 2123449	A	19940512	199918	

Priority Applications (No Type Date): EP 93480104 A 19930730
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 637152	A1	E	26	H04L-012/56	
Designated States (Regional): DE FR GB					
JP 7066835	A		16	H04L-012/56	
US 5491690	A		119	H04L-012/56	
CA 2123449	A			H04L-012/56	
CA 2123449	C			H04L-012/56	

Speeding up path selection **in packet switching** network - ...

...**using** network **access** node **for packet switching communication** network **with several** nodes **interconnected with transmission links which receive and transmit data packets**

...Abstract (Basic): The **node** receives and transmits data packets (301, 302 and 304), and stores and updates the **network** configuration (306). A pre- **selection** of usable links are stored to communicate with each destination **node** located in the **network** .
...

...For each connection request an **optimal** routing path is determined from the access **node** to the destination **node** among the stored pre-**selected** links. In the store **both** backbone **nodes** (402) and local **nodes** (404) can be identified, as well as backbone links (403) and local links (405...

...USE/ADVANTAGE - Splits **network** into backbone and local **nodes** to speed up path **selection** .

...Abstract (Equivalent): A **network** access **node** (300) for a packet switching communication **network** (200) having a **plurality** of **nodes** (201 . . . 208) interconnected with transmission links (209), said **network** access **node** including...

...a **network** topology database **manager** for storing and updating data representing the characteristics and attributes of **nodes** and

transmission links, said data forming a topology database defining the **network** configuration (306...

...link **selection** means responsive to data contained in said topology database for identifying usable links for forming data paths with a destination **node** located in the **network** , said link **selection** means further including means for identifying each link in the **network** as either a backbone link or a local link, means for **selecting** as usable for a path determination all backbone links, means for **selecting** as usable for a path determination all local links attached to the **network** access **node** and to the destination **node** , and means for discarding as not usable for a path determination all other links, and means for storing link identifiers identifying **selected** links in the topology database; and...

...means for determining, for a connection request to the destination **node** , an **optimal** routing path from said access **node** to the destination **node** using only said identified **selected** links...
...Title Terms: **SELECT** ;

34/3,K/44 (Item 44 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010120937 **Image available**
WPI Acc No: 1995-022188/199503
XRPX Acc No: N95-017348

Neural network **for pattern classification and using** best **performing trial branch** node **- determines contribution of each leaf** node **to total output error and adjusts input weights to leaf** nodes **using polynomial equation coeffts. to minimise error**

Patent Assignee: DESIENO D D (DESI-I)
Inventor: DESIENO D D
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5371809	A	19941206	US 92859828	A	19920330	199503	B

Priority Applications (No Type Date): US 92859828 A 19920330
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5371809	A		10	G06K-009/62	

Neural network **for pattern classification and using** best **performing trial branch** node - ...
...**determines contribution of each leaf** node **to total output error and adjusts input weights to leaf** nodes **using polynomial equation coeffts. to minimise error**

...Abstract (Basic): The **network** has a number of processing elements, including a number of leaf **nodes** , each receiving input signals from corresp. input **nodes** and providing output values to respective output **nodes** . Each processing element has at least one input weight associated with each input signal. A **supervisory** device compares each output value to a known classification for a corresp. training example input...

...device determines changes in each input weight w.r.t. the error signal from the **supervisory** device. An identification device **selects** the leaf **node** having the greatest potential to decrease the error signal, and has an accumulator and a comparator. The **accumulator** receives and counts for each leaf **node** an activation value comprising the number of times a given leaf **node** is activated w.r.t. a number of training example input signals and the comparator...

...A pool of trial branch **nodes** is used to **select** a **best** performing trial branch **node** which is used in place of the leaf **node** which has the greatest potential to decrease the error signal. The **best** performing trial branch **node** branches into **two** leaf **nodes** connected to each output **node** . The **supervisory** device generates a continuous training **command** when the number of output values fails to match the known classification and generates a stop training **command** when the number matches the known classification...

...ADVANTAGE - Eliminates leaf **node** once rejected to minimise size of **network** . Integer mathematics can be generated so that separate floating point co-processor is not required...
...Title Terms: **NETWORK** ;

34/3,K/45 (Item 45 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010083766 **Image available**
WPI Acc No: 1994-351479/199444
XRPX Acc No: N94-275825

Token ring LAN **with** work stations **running** both **conventional data and multi-media applications - allows multi-media communication only if** LAN **throughput allocation is sufficient as determined by** LAN **segment** manager

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC); IBM CORP (IBMC)
Inventor: BARRACLOUGH K; CRIPPS P; GAY A; JONES A; CRIPPS P; BARRACLOUGH K R; GAY A C
Number of Countries: 005 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
GB 2278258	A	19941123	GB 9310119	A	19930517	199444	B
EP 625838	A2	19941123	EP 94300700	A	19940131	199445	
JP 6334673	A	19941202	JP 9465960	A	19940404	199508	
US 5553073	A	19960903	US 94245092	A	19940517	199641	
			US 95474826	A	19950607		
EP 625838	A3	19970507	EP 94300700	A	19940131	199731	

RELATED DOCUMENT BENTATH

Priority Applications (No Type Date): GB 9310119 A 19930517
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
GB 2278258	A		28	H04L-012/42	
EP 625838	A2	E	12	H04L-012/42	
Designated States (Regional): DE FR GB					
JP 6334673	A		16	H04L-012/42	
US 5553073	A		10	H04L-012/42	Cont of application US 94245092
EP 625838	A3			H04L-012/42	

Token ring LAN **with** work stations **running** both **conventional data and multi-media applications...**

...**allows multi-media communication only if** LAN **throughput allocation is sufficient as determined by** LAN **segment** manager

...Abstract (Basic): The token ring **LAN** operating method involves assigning a maximum throughput allocation to three priority levels and storing them in a **LAN** segment resource **manager** (LSRM). A request is sent from a **node** to the LSRM requesting permission to commence a first or **second** priority level transmission, together with the desired throughput allocation...

...The LSRM determines whether to award the requesting **node** the desired throughput allocation, dependant on the currently **available** throughput. The LSRM, then responds to the requesting **node** . The LSRM determines, for first priority communications, the maximum time for which the requesting **node** can retain **control** of the token for a single transmission before release of the token and responds accordingly. Any new allocation of throughput is recorded at the LSRM. Communication commences at the requesting **node** in accordance with the LSRM response...

...Abstract (Equivalent): A method of operating a token ring local area **network** , in which a **plurality** of **nodes** are arranged in a ring configuration for circulating a token, a **node** communicating by sending a transmission over the **network** when it has **control** of the token, the **network** supporting at least three levels of communication,

designated first, second and third in decreasing order of importance, wherein said first and second priority...

...level communications, but wherein said second priority level communications are relatively insensitive to latency, the **network** including a **LAN** segment resource **manager** (LSRM) for maintaining information about the first and second priority level communications currently in progress...

...sending a request from a **node** to the LSRM for permission to commence a first or **second** priority level communication, together with a desired throughput allocation...

...determining at the LSRM whether or not to award the requesting **node** the desired throughput allocation, dependent on currently **available** throughput, and responding accordingly to the requesting **node** ;

...

...at the LSRM, for first priority level communications, the maximum time for which the requesting **node** can retain **control** of the token for a single transmission before release of the token, and responding accordingly to the requesting **node** ;

...

...commencing communications at the requesting **node** in accordance with the response from the LSRM and...

...ring, and comparing the token ring communications with the recorded throughput allocations to verity that **nodes** are adhering to their throughput allocations

...Title Terms: **LAN** ;

International Patent Class (Additional): **G06F-013/00**

US005553073A

United States Patent [19]

Barraclough et al.

[11] **Patent Number:** 5,553,073

[45] **Date of Patent:** Sep. 3, 1996

[54] **TOKEN RING NETWORK**

[75] Inventors: **Keith Barraclough**, Romsey; **Peter Cripps**, Locks Heath Southampton; **Adrian Gay**, Fareham; **Alan Jones**, Eastleigh, all of United Kingdom

[73] Assignee: **IBM Corporation**, Armonk, N.Y.

[21] Appl. No.: **474,826**

[22] Filed: **Jun. 7, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 245,092, May 17, 1994, abandoned.

[30] **Foreign Application Priority Data**

May 17, 1993 [GB] United Kingdom 9310119

[51] **Int. Cl.**^{6} **H04L 12/42**

[52] **U.S. Cl.** **370/85.5**; 370/85.6

[58] **Field of Search** 370/85.1, 85.4, 370/85.5, 85.6, 85.12, 85.13, 85.15, 94.2, 85.7, 84; 340/825.5, 825.51

[56] **References Cited**

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4,404,557	9/1983	Grow	370/84
4,459,588	7/1984	Grow	340/825.05
4,675,812	6/1987	Capowski et al.	364/200
5,276,682	1/1994	Van As et al.	370/85.5

OTHER PUBLICATIONS

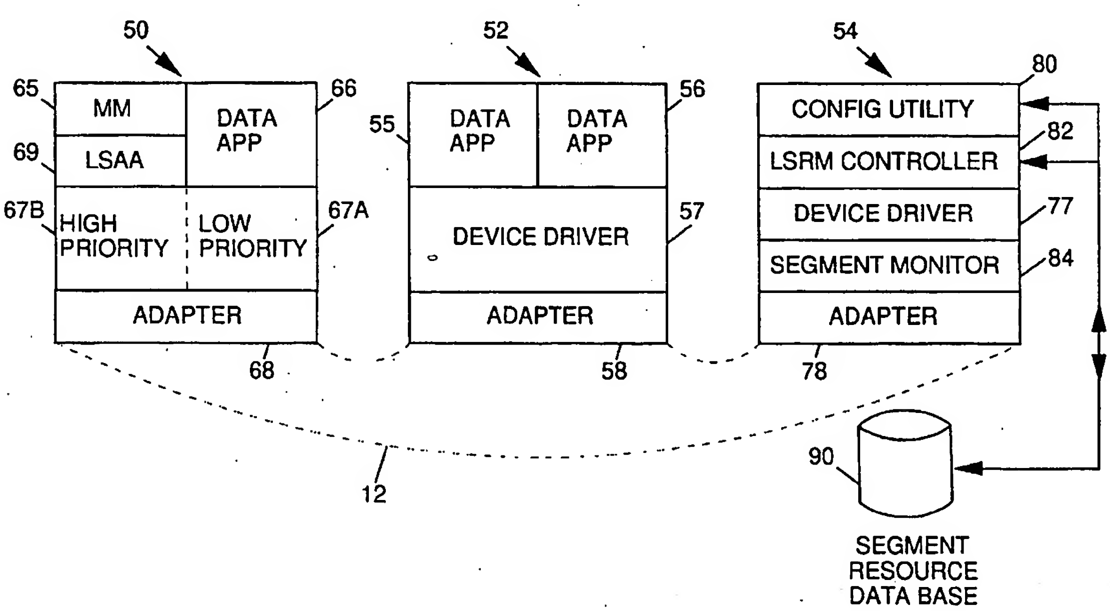
European Search Report.

Primary Examiner—Wellington Chin
Assistant Examiner—Huy D. Vu
Attorney, Agent, or Firm—Jeanine S. Ray-Yarletts

[57] **ABSTRACT**

A token ring local area network includes workstations running both conventional data and multimedia applications. The latter, which generally requires a minimum throughput in order to be viable, can be split into two further categories; those which cannot tolerate excessive latency (end to end delay), typically interactive applications such as voice communications, and those which are less sensitive to latenoy, typically playback operations, the network recognises three priority levels: (1) for latency-sensitive multimedia applications, (2) for latency-insensitive multimedia applications, and (3) conventional applications. All multimedia applications prior to commencement of any communications over the LAN must request an allocation of throughput from a LAN segment resource manager (LSRM), which will only be awarded if there is currently sufficient available throughput on the LAN to support the attended communication. Furthermore, first priority level applications are also given a maximum token holding time, thereby ensuring rapid circulation of the token, and controlling latency.

9 Claims, 3 Drawing Sheets



34/3,K/46 (Item 46 from file: 350)
DIALOG(R)File 350:Derwent WPIX

009998616 **Image available**
WPI Acc No: 1994-266327/199433
XRPX Acc No: N94-209605
Packet network **resource** management **using sub-** nodes **within** nodes - **allows flexibility in** control **point association with** particular **sub-** node , **all** control **functions being capable of execution therewithin**
Patent Assignee: INT BUSINESS MACHINES CORP (IBMC)
Inventor: DERBY J H; DRAKE J E; DUDLEY J G; GUERIN R; KAPLAN M A; MARIN G A ; PETERS M L; POTTER K H
Number of Countries: 005 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 613316	A2	19940831	EP 93480229	A	19931215	199433	B
JP 7007525	A	19950110	JP 93319558	A	19931220	199511	
US 5425021	A	19950613	US 9310136	A	19930128	199529	
EP 613316	A3	19950412	EP 93480229	A	19931215	199544	
US 5483522	A	19960109	US 9310136	A	19930128	199608	
			US 94333194	A	19941102		

RELATED DOCUMENTS BENEATH

Priority Applications (No Type Date): US 9310136 A 19930128; US 94333194 A 19941102
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 613316	A2	E	15	H04Q-011/04	
Designated States (Regional): DE FR GB					
JP 7007525	A		13	H04L-012/56	
US 5425021	A		12	H04J-003/24	
US 5483522	A		12	H04J-003/24	Cont of application US 9310136; Cont of patent US 5425021
EP 613316	A3			H04Q-011/04	

Packet network **resource** management **using sub-** nodes **within** nodes - ...

...**allows flexibility in** control **point association with** particular **sub-** node , **all** control **functions being capable of execution therewithin**

...Abstract (Basic): Within the packet-switching **network** , limited internal **node** communication facilities are made externally visible through the topology database by creating sub- **nodes** connected with intra- **node** links as subsidiary parts of a **node** . The sub- **nodes** contain switching mechanism and associated adapters within the **node** . ...

...Preferably, intra- **node** links represent a bandwidth-limited facility such as a cable, channel or bus between **two** switching mechanisms. The sub- **node** switching mechanism, on the other hand, has sufficient bandwidth capacity for all connections which it supports, without restricting **network** traffic throughput...

...USE/ADVANTAGE - High-speed packet-switching **networks** . Allows **network** nodal **control** functions, e.g. topology, directory, path **selection** , bandwidth **management** and reservation to manage bandwidth-limited internal **node** communication facilities between **multiple** switching mechanisms

...Abstract (Equivalent): A packet switched communication **network** including **two** or more **nodes** connected by transmission links, each

of said **nodes** containing one and only one **control** point for providing various routing and **control** functions, said **network** comprising...

... **two** or more subnodes within one or more of said **nodes** each subnode having access to said functions provided by said **control** point within its **node** ;

...

...intranode communication links connecting the subnodes within the **nodes** which contain subnodes...

...means in each **node** for determining **optimum** routes for packets being sent through the **network** based on information about subnodes within the **network** ; and...

...means in each **node** for creating an address for one or more user applications connected to one or more subnodes, the address of the form NetID. **NodeID** ,SubnodeID.label where...

...NetID is a one to eight byte unique **designation** for the **network** ;

...

... **NodeID** is a one to eight byte unique **designation** for a **node** within said **network** ;

...

...subnodeID is a one to eight byte unique **designation** for said one or more subnodes within said **node** ; and...

...label **designates** said one or more user applications connected to said one or more subnodes...

...The method in a **node** in a packet switched communications **network** , involves determining for each **node** , which sub- **nodes** have external links that are to be part of the spanning tree. It is also determined the sub- **node** within which a **control** point resides. A set of intra- **node** links is **selected** in each **node** to provide a connection path between the sub- **node** in which the **control** point residues and the sub- **nodes** having external links. The set of intra- **node** links are programmed with a tree address, so that the set included in the spanning...

...ADVANTAGE - Maintains and de-allocates reserved bandwidth. **Control** functions can be changed dynamically

...Title Terms: **NETWORK** ;

US005483522A

United States Patent [19]

Derby et al.

[11] Patent Number: 5,483,522

[45] Date of Patent: Jan. 9, 1996

[54] **PACKET SWITCHING RESOURCE MANAGEMENT WITHIN NODES**

[75] Inventors: **Jeffrey H. Derby**, Chapel Hill; **John E. Drake, Jr.**, Pittsboro; **John G. Dudley**, Raleigh, all of N.C.; **Roch Guerin**, Yorktown Heights; **Marc A. Kaplan**, Katonah, both of N.Y.; **Gerald A. Marin**, Chapel Hill, N.C.; **Marcia L. Peters**, Pittsboro, N.C.; **Kenneth H. Potter, Jr.**, Raleigh, N.C.

[73] Assignee: **International Business Machines Corp.**, Armonk, N.Y.

[21] Appl. No.: **333,194**

[22] Filed: **Nov. 2, 1994**

Related U.S. Application Data

[63] Continuation of Ser. No. 10,136, Jan. 28, 1993, Pat. No. 5,425,021.

[51] **Int. Cl.**^{6} **H04J 3/24**; H04Q 11/04; H04L 12/56

[52] **U.S. Cl.** **370/54**; 370/60; 370/94.1; 370/94.3; 340/825.02; 340/826

[58] **Field of Search** 370/16, 54, 60, 370/85.13, 85.14, 94.1, 94.3; 340/825.02, 825.03, 826, 827, 825.5, 825.51, 825.52

[56] **References Cited**

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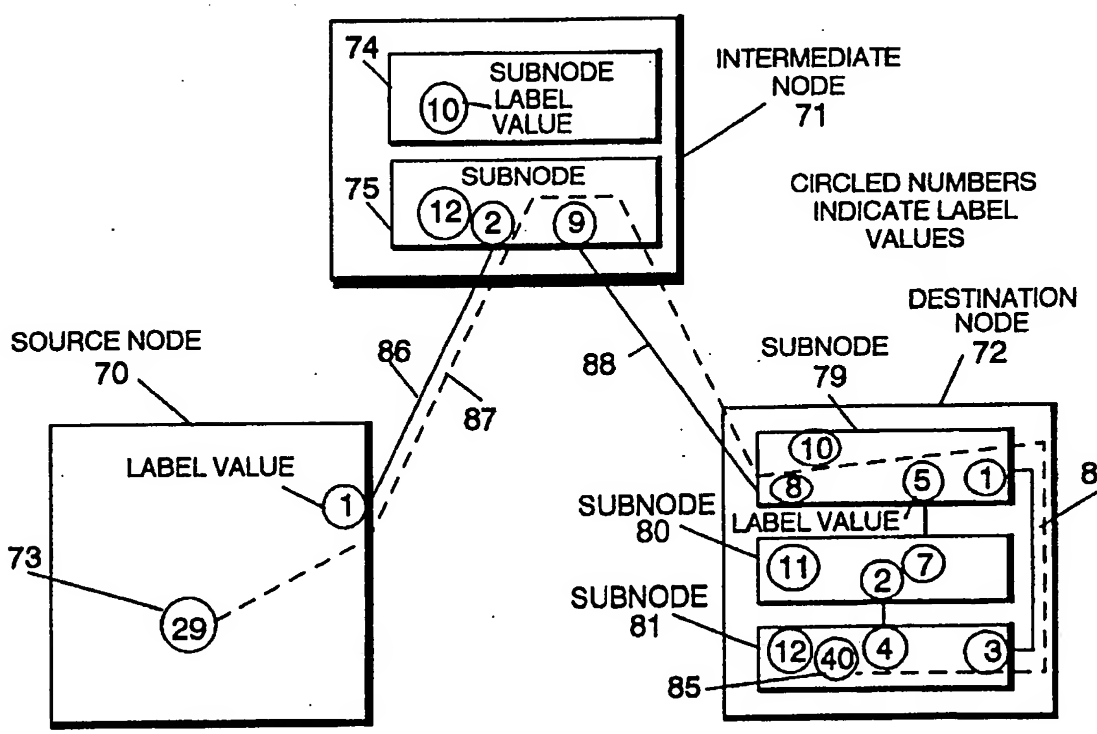
4,644,532	2/1987	George et al.	370/94.3
4,679,189	7/1987	Olson et al.	370/60
4,740,954	4/1988	Cotton et al.	370/60
4,864,559	9/1989	Perlman	370/94.3
4,939,726	7/1990	Flammer et al.	370/94.1
5,150,360	9/1992	Perlman et al.	370/94.3

Primary Examiner—Alpus Hsu
Attorney, Agent, or Firm—Steven B. Phillips

[57] **ABSTRACT**

Method and apparatus for managing internal-node communications in a packet switching network by calculating optimal routes for packets and addressing subnodes within packet nodes using a specific message format. Internal communication facilities called intranode links connect multiple subnodes within nodes. Each subnode contains a switching mechanism and routes packet to other nodes, subnodes, or user applications using a specific message format. The message format allows specific subnodes anywhere in the network to the addressed by any other subnode, making communications more efficient and simplifying the management of internode links.

6 Claims, 5 Drawing Sheets



5/13/2005, EAST Version: 2.0.1.4

US005425021A

United States Patent [19]

Derby et al.

[11] **Patent Number:** **5,425,021**

[45] **Date of Patent:** **Jun. 13, 1995**

[54] **PACKET SWITCHING RESOURCE MANAGEMENT WITHIN NODES**

[75] Inventors: **Jeffrey H. Derby**, Chapel Hill; **John E. Drake, Jr.**, Pittsboro; **John G. Dudley**, Raleigh, all of N.C.; **Roch Guerin**, Yorktown Heights; **Marc A. Kaplan**, Katonah, both of N.Y.; **Gerald A. Marin**, Chapel Hill; **Marcia L. Peters**, Pittsboro, both of N.C.; **Kenneth H. Potter, Jr.**, Raleigh, N.C.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: **10,136**

[22] Filed: **Jan. 28, 1993**

[51] Int. Cl.[6] **H04J 3/24**; H04Q 11/04; H04L 12/56

[52] U.S. Cl. **370/54**; 370/60; 370/94.1; 370/94.3; 340/825.02; 340/826

[58] Field of Search 370/16, 54, 60, 85.13, 370/85.14, 94.1, 94.3; 340/825.02, 825.5, 825.51, 825.52, 826, 827

[56] **References Cited**

U.S. PATENT DOCUMENTS

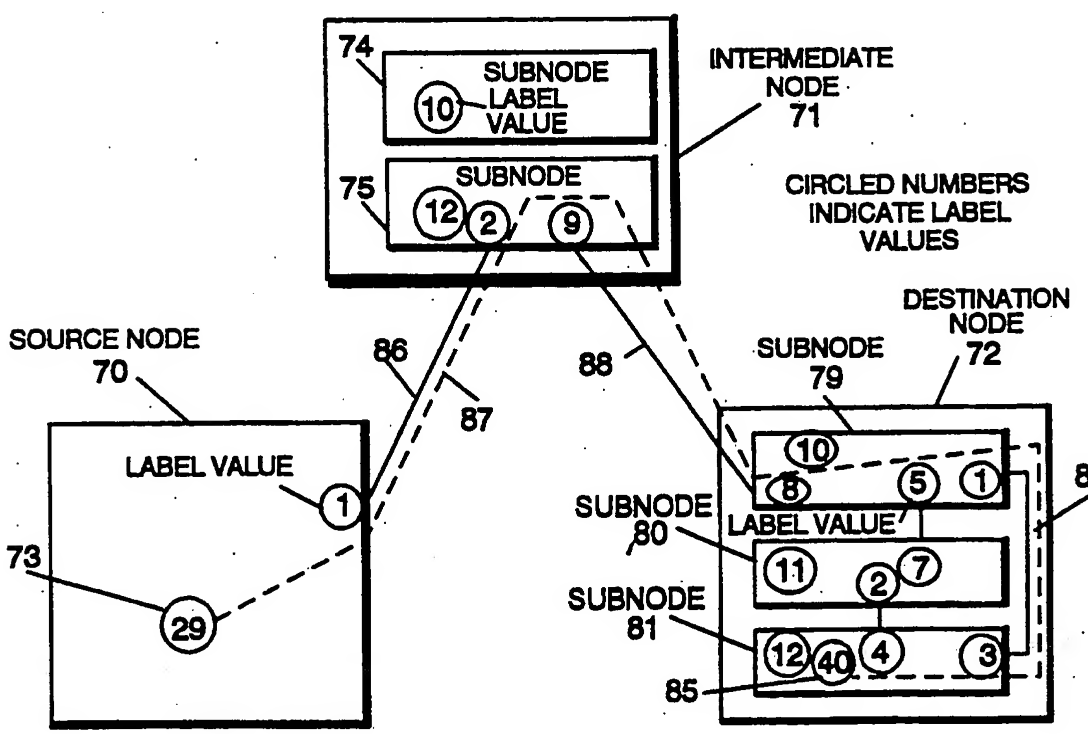
4,644,532	2/1987	George et al.	370/94.3
4,679,189	7/1987	Olson et al.	370/60
4,740,954	4/1988	Cotton et al.	370/60
4,864,559	9/1989	Perlman	370/94.3
4,939,726	7/1990	Flammer et al.	370/94.1
5,150,360	9/1992	Perlman et al.	370/94.3

Primary Examiner—Alpus Hsu
Attorney, Agent, or Firm—Steven B. Phillips

[57] **ABSTRACT**

Method and apparatus for making limited internal-node communication facilities externally visible in a packet switching network. Internal-node communication facilities are called intranode links, can include any cable, channel, bus, etc. over which data passes, and are used to connect the multiple subnodes within a given node. Each subnode contains a switching mechanism and routes packets to other nodes, subnodes, or user applications. Each node provides network control functions such as topology, directory, path selection, and bandwidth management which can manage intranode links in the same manner that internode links are currently managed.

3 Claims, 5 Drawing Sheets



34/3,K/47 (Item 47 from file: 350)
DIALOG(R)File 350:Derwent WPIX

009813933 **Image available**
WPI Acc No: 1994-093789/199412
Related WPI Acc No: 1992-325064; 1992-325125; 1992-325126; 1992-325127; 1992-325128; 1992-325445; 1992-325446; 1993-328243; 1994-093743; 1994-093747; 1994-093749; 1994-094295; 1994-366262; 1995-008875; 1995-163664; 1995-292815; 1997-525950; 1998-230141
XRPX Acc No: N94-073579
Multipath **torus switching appts for digital** computer **systems - uses number of processor and input-output functional elements which serve as** nodes **to transmit or receive information to** networked computer **system**
Patent Assignee: INT BUSINESS MACHINES CORP (IBMC)
Inventor: OLNOWICH H T; WILLIAMS A R
Number of Countries: 004 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 588104	A2	19940323	EP 93113397	A	19930823	199412	B
US 5408646	A	19950418	US 91677543	A	19910329	199521	
			US 91794497	A	19911127		
			US 91799602	A	19911127		
			US 92946203	A	19920917		
EP 588104	A3	19970129	EP 93113397	A	19930823	199713	

Priority Applications (No Type Date): US 92946203 A 19920917; US 91677543 A 19910329; US 91794497 A 19911127; US 91799602 A 19911127
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 588104	A2	E	22	G06F-015/16	
Designated States (Regional): DE FR GB					
US 5408646	A		19	H04J-003/26	CIP of application US 91677543
					CIP of application US 91794497
					CIP of application US 91799602
EP 588104	A3			G06F-015/16	

Multipath **torus switching appts for digital** computer **systems...**

...**uses number of processor and input-output functional elements which serve as** nodes **to transmit or receive information to** networked computer **system**

...Abstract (Basic): The multipath torus switching apparatus comprises a switch interconnection **network** , a number of processor and input/output function elements, a data message and a message rejection function. The switch interconnection **network** couples **multiple nodes** through input to output port connections. The processor and input/output functional elements serve as **nodes** of a **parallel** system and are capable of transmitting and/or receiving information to the **network** .
...

...Data for transmitting information via the data **network** , including a message **header** , is contained in the data message. The **node** sending the data message functions as a sending **node** and the **node** receiving the data message functions as a receiving **node** . Data messages are appended with cyclic redundancy code characters, at the sending **node** , and compared to identically regenerate cyclic redundancy characters at the receiving **node** . The data messages are accepted for further

processing, by the receiving **node** , if the compare is equal. The message rejection function rejects data messages if the compare...

...ADVANTAGE - Routing at intermediate torus **network** stages is significant improvement over traditional wormhole approach

...Abstract (Equivalent): The torus switch uses the **multipath** approach to establish a connection between **two** specific **nodes** over various alternate routes simultaneously. If only one route is **available** , the multipath approach will find that path instantaneously and establish the desired connection with minimal...

...other options free to be used by other connections. In addition, routing at intermediate torus **network** stages improves over the wormhole approach...

...ADVANTAGE - With low latency performance, improves torus **network** connection time by trying multipaths in one single high speed operation ...

...Title Terms: **COMPUTER ;**

International Patent Class (Main): **G06F-015/16** ...

34/3,K/52 (Item 52 from file: 350)
DIALOG(R)File 350:Derwent WPIX

009204577 **Image available**
WPI Acc No: 1992-332009/199240
XRPX Acc No: N92-253584

Method of routing cell messages in networks **based on** node **queuing - having** master node **adaptively** selecting **and validating candidate route for each slave** node **on basis of loading, delay and bandwidth**

Patent Assignee: STRATACOM INC (STRA-N)
Inventor: CORBALIS C M; NARDIN R P
Number of Countries: 033 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9216066	A1	19920917	WO 92US1490	A	19920225	199240	B
AU 9215869	A	19921006	AU 9215869	A	19920225	199301	
			WO 92US1490	A	19920225		
US 5317562	A	19940531	US 91663256	A	19910228	199421	
			US 9358781	A	19930507		
JP 6509689	W	19941027	JP 92508202	A	19920225	199502	
			WO 92US1490	A	19920225		
DE 4290562	T	19960307	DE 4290562	A	19920225	199615	
			WO 92US1490	A	19920225		

Priority Applications (No Type Date): US 91663256 A 19910228; US 9358781 A 19930507
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9216066	A1	E	44	H04L-012/56	

Designated States (National): AT AU BB BG BR CA CH DE DK ES FI GB HU JP KP KR LK LU MG MW NL NO RO RU SD SE
Designated States (Regional): AT BE CH DE DK ES FR GB GR IT LU MC NL OA SE

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
AU 9215869	A			H04L-012/56	Based on patent WO 9216066
US 5317562	A		19	H04L-012/56	Cont of application US 91663256
JP 6509689	W		1	H04L-012/48	Based on patent WO 9216066
DE 4290562	T		19	H04L-012/56	Based on patent WO 9216066

Method of routing cell messages in networks **based on** node **queuing...**

...**having** master node **adaptively** selecting **and validating candidate route for each slave** node **on basis of loading, delay and bandwidth**

...Abstract (Basic): The method is used by a **master node** routing connections to a slave **node** in a cell **network** . Candidate slave connections are identified and ordered accoridng to loading. Existing connections are then searched for a candidate **best** route between **master node** and candidate slave...

...USE/ADVANTAGE - For adaptively **selecting** routes based on actual max. delay of each route link and for configuring max. delays...

...Abstract (Equivalent): In a cell switching **network** having a **multiplicity** of **nodes** , the method of rerouting connections involves identifying connections requiring rerouting, and ordering these connections according to their associated loading. A partic. connection is **selected** from the connections needing to be rerouted and that have been ordered, the **selected** connection connecting a **selected master node** and a **selected** slave **node** . The **selected** connection is rerouted by **selecting** candidate routes from among working routes connecting the **master** and slave **nodes** , each candidate route having

the smallest route delay as compared to route delays of other working routes between the **two** **nodes** , and each having a partic. bandwidth ...

...the candidate route is within a user configurable prescribed limit for the type of the **selected** connection and if the bandwidth of the candidate route is sufficient to accommodate the **selected** connection. The **selected** connection is rerouted via a one of the true validated candidate routes. A validated route description table is updated in the **master** **node** to reflect packing of the candidate route by which the **selected** connection has been rerouted. The validated route table includes the route delay, bandwidth, and packing...

...USE/ADVANTAGE - For cell switching **network** . Ensures uniformly sampled reconstructed voice signal at destination by using user configurable delays...

...Title Terms: **NETWORK** ;

34/3,K/54 (Item 54 from file: 350)
DIALOG(R)File 350:Derwent WPIX

009074187 **Image available**
WPI Acc No: 1992-201606/199225
XRPX Acc No: N92-152586

Synchronisation of private telecommunications networks **- achieving synchronisation of each** node **by cascading, with back up synchronisation also provided**

Patent Assignee: ALCATEL BUSINESS SYSTEMS LTD (COGE); ALCATEL BUSINESS SYSTEMS SA (COGE); ALCATEL ALSTHOM CIE GEN ELECTRICITE (COGE)
Inventor: CORDONNIER C; GASS R
Number of Countries: 011 Number of Patents: 010
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 490315	A1	19920617	EP 91121080	A	19911209	199225	B
AU 9188975	A	19920618	AU 9188975	A	19911210	199232	
FR 2670345	A1	19920612	FR 9015496	A	19901211	199232	
JP 4275737	A	19921001	JP 91327836	A	19911211	199246	
AU 656343	B	19950202	AU 9188975	A	19911210	199513	
US 5475717	A	19951212	US 91804379	A	19911210	199604	
			US 94352817	A	19941201		
EP 490315	B1	19980527	EP 91121080	A	19911209	199825	
DE 69129490	E	19980702	DE 629490	A	19911209	199832	
			EP 91121080	A	19911209		
ES 2116992	T3	19980801	EP 91121080	A	19911209	199838	
JP 3130989	B2	20010131	JP 91327836	A	19911211	200109	

Priority Applications (No Type Date): FR 9015496 A 19901211
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 490315	A1	F	10	H04J-003/06	
Designated States (Regional): AT BE DE ES FR GB IT NL					
AU 9188975	A			H04L-012/28	
FR 2670345	A1			H04L-012/48	
JP 4275737	A		9	H04L-007/00	
AU 656343	B			H04L-012/28	Previous Publ. patent AU 9188975
US 5475717	A		9	H04L-007/00	Cont of application US 91804379
EP 490315	B1	F		H04J-003/06	
Designated States (Regional): AT BE DE ES FR GB IT NL					
DE 69129490	E			H04J-003/06	Based on patent EP 490315
ES 2116992	T3			H04J-003/06	Based on patent EP 490315
JP 3130989	B2		8	H04L-007/00	Previous Publ. patent JP 4275737

Synchronisation of private telecommunications networks - ...
...**achieving synchronisation of each** node **by cascading, with back up synchronisation also provided**

...Abstract (Basic): Numerical information is transmitted through a **network** containing a number of **nodes** (2). Transmitted information is synchronised via clock signals injected via external **nodes** . Each **node** receives a clock signal via an input port (P1) and retransmits the **best available** clock signal to the next **node** via an output port (P2...

...The principal clock signals are sent in cascade along the **nodes** ; however there is a back up exchange of clock information between **nodes** allowing the clock signal to be **chosen** internally by each **node** and re-routing of clock signals. Thus good synchronisation is obtained

throughout the **node** **network** .

...

...ADVANTAGE - Provides effective clock synchronisation that does not need **supervision** .

...Abstract (Equivalent): A method of synchronizing **nodes** of a private telecommunication **network** to **best** **available** clock signals at all times, wherein said private telecommunication **network** comprises a **plurality** of **nodes** which transmit at least synchronization information to each other via point-to-point digital transmission links, each **node** of said private telecommunication **network** comprising means for storing **node** characteristic data comprising information indicating **available** clock signals, respective quality levels of said **available** clock signals, and potential supply information indicating whether a **node** is adapted to supply clock signals, and means for **selecting** a **best** **available** clock signal based upon said **node** characteristic data and said synchronization information exchanged between **nodes** when a loss of previously received clock signals is detected, said **nodes** being synchronized by clock signals supplied by one of said point-to-point digital transmission...

...preselecting, for each **node** directly connected to at least **two** point-to-point digital transmission links, at least two point-to-point digital transmission link ports, one being **designated** a **master** clock port and the other being **designated** a backup clock port, wherein **nodes** comprising said at least **two** point-to-point digital transmission link ports form a synchronization tree of said private telecommunication **network** ;

...

...preselecting said **nodes** comprising said at least **two** point-to-point digital transmission link ports as potential supplier **nodes** for potentially supplying said clock signals to **nodes** which are directly connected to said potential supplier **nodes** via a point-to-point digital transmission link, wherein said **nodes** comprising said at least **two** point-to-point digital transmission link ports are assigned potential supply information...

...storing said potential supply information as one of said **node** characteristic data...

...detecting a loss of said previously received clock signals by at least one of said **nodes** ;

...

...initiating an exchange of said synchronization information between said at least one of said **nodes** detecting said loss of said previously received clock signals and each **node** directly connected to said at least one of said **nodes** via a corresponding point-to-point digital transmission link, wherein each exchange of said synchronization...

...a synchronization proposal which is one of: (a) from said at least one of said **nodes** having detected said loss of said previously received clock signals to one of said **nodes** directly connected to said at least one of said **nodes** , and (b) one **node** having received said synchronization proposal to another **node** with which said one **node** is directly connected via a point-to-point digital transmission link; and...

...determining, for said at least one of said **nodes** detecting said loss of said previously received clock signals and for each of said **nodes** receiving said synchronization proposal, a **best available** clock signal for synchronization based upon said synchronization information transmitted and received during said exchange

...Title Terms: **NETWORK** ;

```
Set     Items   Description
S1     460063   NODE? OR HUB OR HUBS OR CPU OR CPUS OR COMPUTER? OR SUBSTA-
             TION?
S2     230665   WORKSTATION? OR WORK()STATION? OR SERVER? OR DATAPROCESS? -
             OR MICROPROCESS? OR CENTRALPROCESS? OR (DATA OR MICRO OR CENT-
             RAL)()PROCESS?
S3    1300195   MASTER? OR CONTROL? OR COMMAND? OR SUPERVIS? OR MANAGER? OR
              MANAGEMENT? OR LEADER? OR HEAD? OR (TASK? OR JOB OR JOBS OR -
             WORK? OR LOAD?)(2N)(ALLOCAT? OR DISTRIB? OR DELEGAT? OR PARCE-
             L? OR METE? OR BALANC?)
S4    1762411   TARGET? OR SELECT? OR CHOSEN? OR SPECIFIC? OR DESIGNAT? OR
             NAMED? OR PARTICULAR?
S5      67578   S1:S2(5N)S3 AND S1:S2(5N)S4
S6      43470   S5 AND (NETWORK? OR LAN OR WAN OR ETHERNET? OR INTERNET? OR
              INTRANET? OR ROUTER? OR WORLD()WIDE()WEB)
S7     143931   IC=G06F?
S8      26967   S5 AND S7
S9      50065   S6 OR S8
S10      3091   S9 AND S1:S2(5N)(HAMMING()DISTANC? OR UNCOMMON? OR DISTING-
             UISH? OR DISTINCTION? OR DIFFERENCE?)
S11       713   S9 AND S1:S2(5N)(UNALLIE? OR (NON OR "NOT")(2W)(ALLIE? OR -
             OVERLAPPING? OR GROUP? OR SHARE? OR SHARING? OR COMMON OR PAR-
             TICIPAT?))
S12      3644   S10:S11
S13     16114   S9 AND S1:S2(5N)(AVAILAB? OR FREE OR ON()(DECK OR HAND) OR
             UNOCCUP? OR UNCOMMIT? OR UNDEDICAT?)
S14      1415   S9 AND S1:S2(5N)((NON OR "NOT")(2W)(OCCUP? OR COMMIT? OR D-
             EDICAT? OR USE OR BEING()USED))
S15     16737   S13:S14
S16       451   S9 AND S1:S2(5N)((PARTICIPAT? OR GROUP? OR CLUB? OR OVERLA-
             P? OR IMBRICAT? OR MEMBER? OR (TAKE? OR TAKING)()PART OR PART-
             AK? OR COOPERAT?)(5N)(INDEX? OR INDICES? OR FACTOR? OR VALUE?
             OR QUOTI? OR QUOTA? OR GUIDE? OR SCALE? OR INDICATOR?))
S17      5018   S9 AND S1:S2(5N)(OPTIMAL? OR OPTIMUM? OR OPTIMIZ? OR OPTIM-
             IS? OR SUPERLAT? OR BEST OR MOST()(FAVORAB? OR ADVANTAG? OR E-
             FFICIENT?) OR SHORTEST? OR (INCREAS? OR FAST? OR QUICK?)(2N)(-
             OUTPUT? OR THRUPUT? OR THROUGHPUT?))
S18     18893   S9 AND S1:S2(5N)(COMBINAT? OR COLLECT? OR CLUSTER? OR AGGR-
             EGAT? OR ACCUMULAT? OR ENSEMBL? OR ASSEMBL? OR GROUP?)
S19     26205   S9 AND S1:S2(5N)(PLURAL? OR MULTIP? OR MULTIT? OR ASSORTME-
             NT? OR ARRAY? OR POOL?)
S20     23495   S9 AND S1:S2(5N)(PAIR? OR 2ND OR SECOND? OR DUAL? OR TWIN -
             OR DOUBL? OR DUPLE? OR TANDEM? OR PARALLEL?)
S21     22736   S9 AND S1:S2(5N)(TWO OR BOTH)
S22      1847   S12 AND S15 AND S18:S21
S23       567   S12 AND S15 AND S16:S17
S24       565   S22 AND S23
S25        63   S24 AND S16 AND S17
S26       529   S24 AND S18:S19 AND S20:S21
S27        62   S25 AND S26
S28        63   S25 OR S27
S29    959192   AD=2001:2005
S30        44   S28 NOT S29
S31        44   IDPAT (sorted in duplicate/non-duplicate order)
? show files
File 348:EUROPEAN PATENTS 1978-2005/May W02
         (c) 2005 European Patent Office
File 349:PCT FULLTEXT 1979-2005/UB=20050505,UT=20050428
         (c) 2005 WIPO/Univentio
?
```

31/3/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00808069
Framework for managing cluster membership in a multiprocessor system
Struktur zur Gruppenzugehorigkeitsverwaltung in einem Mehrfachrechnersystem
Structure pour gerer l'appartenance a un groupe dans un systeme multiprocesseur

PATENT ASSIGNEE:
DATA GENERAL CORPORATION, (410941), 4400 Computer Drive, Westboro Massachusetts 01580, (US), (Proprietor designated states: all)

INVENTOR:
Alfieri, Robert A., 318 Oakwood Place, Menlo Park, California 94025, (US)
Compton, James T., 2215 West Club Boulevard, Durham, North Carolina 27705, (US)
Huber, Andrew R., 1000 Belmont Boulevard, Apartment 305, Monroeville, Pennsylvania, (US)
McGrath, Paul T., 8608 Brookdale Drive, Raleigh, North Carolina 27613, (US)
Soufi, Khaled S., 2805-K Bainbridge Drive, Durham, North Carolina 27713, (US)
Thorstad, Brian J., 102 Kettlebridge Drive, Cary, North Carolina 27511, (US)
Vook, Eric R., 308 Summerfield Crossing Road, Chapel Hill, North Carolina 27514, (US)

RELATED DOC. BENEATH

LEGAL REPRESENTATIVE:
Abnett, Richard Charles (27531), REDDIE & GROSE 16 Theobalds Road, London WC1X 8PL, (GB)

PATENT (CC, No, Kind, Date): EP 750256 A2 961227 (Basic)
EP 750256 A3 980930
EP 750256 B1 030827
APPLICATION (CC, No, Date): EP 96304599 960620;
PRIORITY (CC, No, Date): US 493550 950623
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: **G06F-009/46 ; G06F-015/16**
ABSTRACT WORD COUNT: 161
NOTE:
Figure number on first page: 1

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB96	1790
CLAIMS B	(English)	200335	1764
CLAIMS B	(German)	200335	1787
CLAIMS B	(French)	200335	1994
SPEC A	(English)	EPAB96	7314
SPEC B	(English)	200335	7352
Total word count - document A			9106
Total word count - document B			12897
Total word count - documents A + B			22003

US005666486A

United States Patent [19]

Alfieri et al.

[11] Patent Number: 5,666,486

[45] Date of Patent: Sep. 9, 1997

[54] MULTIPROCESSOR CLUSTER MEMBERSHIP MANAGER FRAMEWORK

[75] Inventors: **Robert A. Alfieri**, Apex; **James T. Compton**, Durham, both of N.C.; **Andrew R. Huber**, Monroeville, Pa.; **Paul T. McGrath**, Raleigh, N.C.; **Khaled S. Soufi**, Durham, N.C.; **Brian J. Thorstad**, Cary, N.C.; **Eric R. Vook**, Chapel Hill, N.C.

[73] Assignee: **Data General Corporation**, Westboro, Mass.

[21] Appl. No.: **493,550**

[22] Filed: **Jun. 23, 1995**

[51] Int. Cl.[6] **G06F 15/16**

[52] U.S. Cl. **395/200.47**; 395/200.53; 364/131

[58] Field of Search 395/200.01, 200.02, 395/200.03, 200.04, 200.05, 200.06, 200.08, 200.1, 200.12, 650; 364/131, 132, 133, 134, 942.3, 942.4, 942.5, 942.51, 942.6

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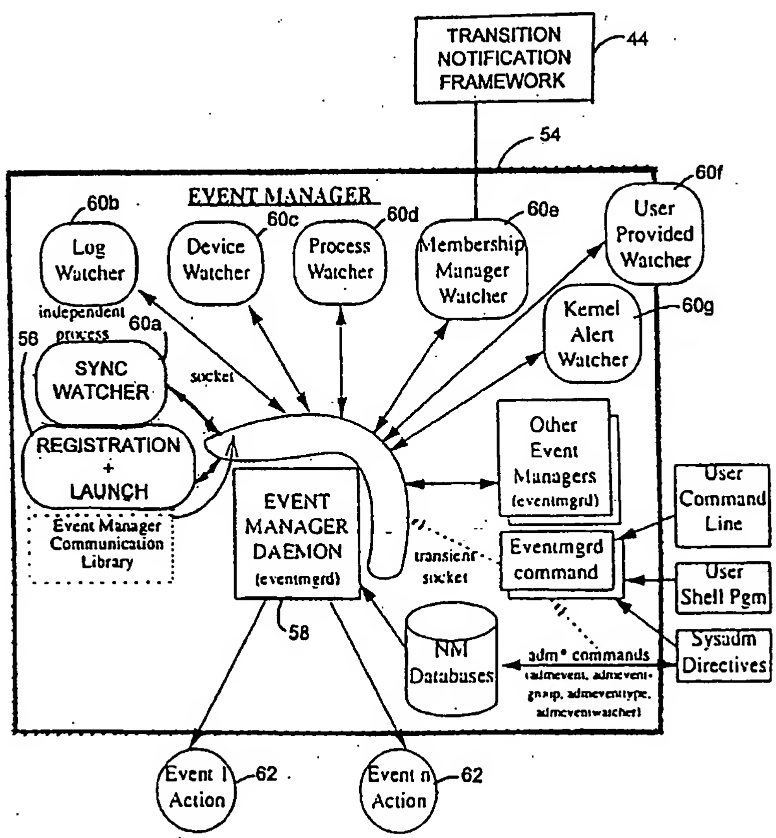
5,390,316	2/1995	Cramer et al.	395/425
5,446,841	8/1995	Kitano et al.	395/200
5,448,470	9/1995	Nishihata et al.	364/131

Primary Examiner—Douglas W. Olms
Assistant Examiner—Matthew C. Phillips
Attorney, Agent, or Firm—Van Dyke, Gardner, Linn & Burkhart, LLP

[57] ABSTRACT

A shared-disk cluster system includes a cluster membership manager framework which coordinates the joining or leaving among all nodes in a cluster including taking the multiple layers of involved subsystems through transitions. Subsystems are notified of transitions in particular order depending upon the transition, and all nodes' subsystems receiving a notification must process that notification prior to another layer of subsystems being notified. One of the subsystems registered for notification is an event manager in user space. The event manager carries out transfers of client services, including user applications, resulting from nodes joining and leaving the cluster. This includes a registration and launch service which registers a node, or multiple nodes, in a cluster which claims, or is assigned, responsibility for the service and provides an optional launching function which initiates the client service upon successful registration.

44 Claims, 23 Drawing Sheets



31/3/5 (Item 5 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00807391 **Image available**
SYSTEM FOR DISTRIBUTING LOAD BALANCE AMONG MULTIPLE SERVERS IN CLUSTERS
SYSTEME DE REPARTITION D'EQUILIBRE DE CHARGE PARMI DE MULTIPLES SERVEURS EN GRAPPES
Patent Applicant/Assignee:
WARP SOLUTIONS INC, 627 Greenwich St., 12th Floor, New York, NY 10014, US , US (Residence), US (Nationality)
Inventor(s):
PRIMAK Leonard, 284 Mott Street #20, New York, NY 10020, US,
GNIP John, 62-42 Woodhaven Blvd., Rego Park, NY 11374, US,
VOLOVICH Gene R, 176 1/2 Hamilton Avenue, Greenwich, CT 06830, US,
Legal Representative:
IM C Andrew (agent), Fulbright & Jaworski L.L.P., 666 Fifth Avenue, New York, NY 10103, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200140962 A1 20010607 (WO 0140962)
Application: WO 2000US28175 20001010 (PCT/WO US0028175)
Priority Application: US 99169196 19991206; US 2000565259 20000505
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ EE ES
FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU
LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR
TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 4191

RELATED DOCUMENT BENEATH

US006389448B1

(12) United States Patent
Primak et al.

(10) **Patent No.:** **US 6,389,448 B1**

(45) **Date of Patent:** **May 14, 2002**

(54) **SYSTEM AND METHOD FOR LOAD BALANCING**

(75) Inventors: **Leonard Primak**, New York; **John Gnip**, Rego Park, both of NY (US); **Gene R. Volovich**, Greenwich, CT (US)

(73) Assignee: **WARP Solutions, Inc.**, New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/565,259**

(22) Filed: **May 5, 2000**

Related U.S. Application Data

(60) Provisional application No. 60/169,196, filed on Dec. 6, 1999.

(51) **Int. Cl.**[7] **G06F 13/00**

(52) **U.S. Cl.** **709/105**; 709/225; 709/226; 709/229

(58) **Field of Search** 709/104, 105, 709/203, 217, 219, 223, 225, 226, 227, 229, 232, 238

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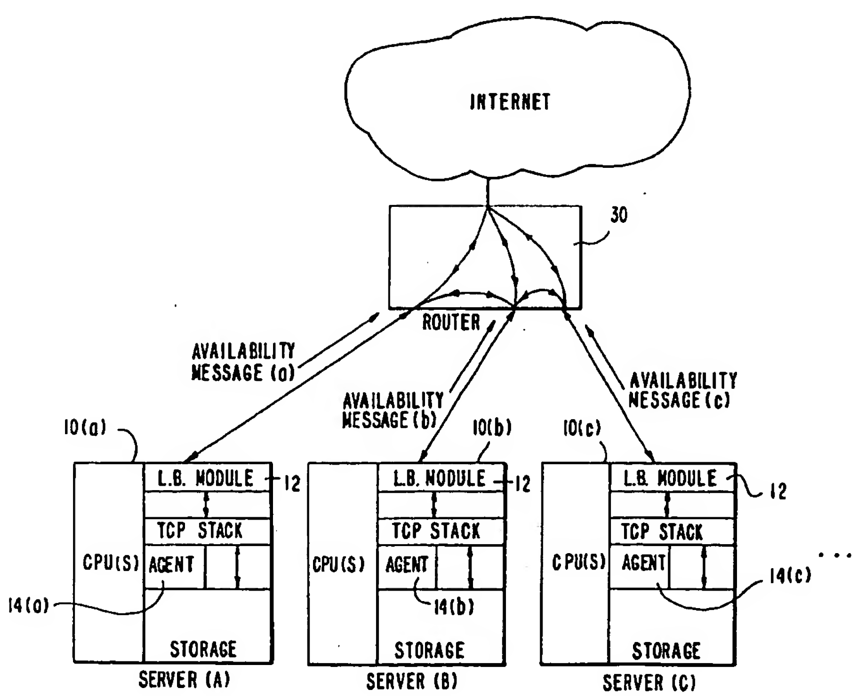
Primary Examiner—Viet D. Vu

(74) *Attorney, Agent, or Firm*—Fulbright & Jaworski LLP

(57) **ABSTRACT**

A system for distributing load between multiple servers where more than one server in a sever cluster receives a request for connection from a client and each server makes a determination of whether or not to respond to the request. Software modules running on the servers monitor and communicate relative abilities of each server to respond to client requests. Each server responding to a percentage of client requests corresponding to its relative ability to respond.

20 Claims, 9 Drawing Sheets



31/3/9 (Item 9 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00802047 **Image available**
DISTRIBUTED TRAFFIC CONTROLLING SYSTEM AND METHOD FOR NETWORK DATA
SYSTEME DE COMMANDE DU TRAFIC DISTRIBUE ET PROCEDE POUR DONNEES DE RESEAU
Patent Applicant/Assignee:
RAINFINITY INC, Suite 200, 87 N. Raymond Avenue, Pasadena, CA 91103, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
BRUCK Jehoshua, 5657 Bramblewood Road, La Canada, CA 91011, US, US (Residence), US (Nationality), (Designated only for: US)
BOHOSSIAN Vasken, 1127 E. Del Mar Boulevard #227, Pasadena, CA 91106, US, US (Residence), CA (Nationality), (Designated only for: US)
FAN Chenggong, 1155 E. Del Mar Boulevard #105, Pasadena, CA 91106, US, US (Residence), CN (Nationality), (Designated only for: US)
LEMAHIEU Paul, 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106, US, US (Residence), US (Nationality), (Designated only for: US)
LOVE Philip, 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106, US, US (Residence), GB (Nationality), (Designated only for: US)
Legal Representative:
HALL David A (et al) (agent), Heller Ehrman White & McAuliffe, LLP, Suite 700, 4250 Executive Square, La Jolla, CA 92037, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200135601 A1 20010517 (WO 0135601)
Application: WO 2000US9966 20000412 (PCT/WO US0009966)
Priority Application: US 99437637 19991110
Parent Application/Grant:
Related by Continuation to: US 99437637 19991110 (CIP)
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 18369

RELATED DOC. BEN EATH

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
17 May 2001 (17.05.2001)

PCT

(10) International Publication Number
WO 01/35601 A1

(51) International Patent Classification[7]: H04L 29/06

(21) International Application Number: PCT/US00/09966

(22) International Filing Date: 12 April 2000 (12.04.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/437,637 10 November 1999 (10.11.1999) US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US 09/437,637 (CIP)
Filed on 10 November 1999 (10.11.1999)

(71) Applicant (for all designated States except US): RAINFINITY, INC. [US/US]; Suite 200, 87 N. Raymond Avenue, Pasadena, CA 91103 (US).

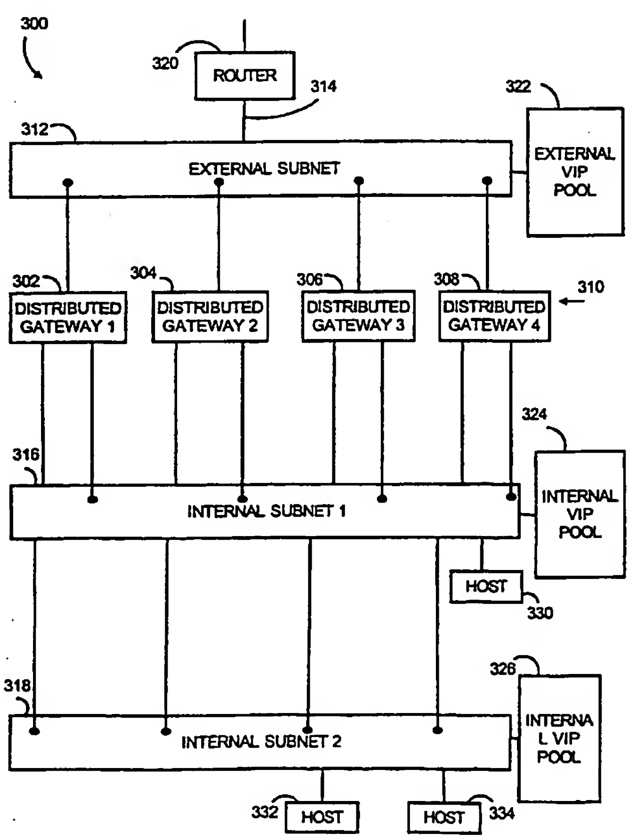
(72) Inventors; and
(75) Inventors/Applicants (for US only): BRUCK, Jehoshua [US/US]; 5657 Bramblewood Road, La Canada, CA 91011 (US). BOHOSSIAN, Vasken [CA/US]; 1127 E. Del Mar Boulevard #227, Pasadena, CA 91106 (US). FAN, Chenggong [CN/US]; 1155 E. Del Mar Boulevard #105, Pasadena, CA 91106 (US). LEMAHIEU, Paul [US/US]; 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106 (US). LOVE, Philip [GB/US]; 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106 (US).

(74) Agents: HALL, David, A. et al.; Heller Ehrman White & McAuliffe LLP, Suite 700, 4250 Executive Square, La Jolla, CA 92037 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ,

[Continued on next page]

(54) Title: DISTRIBUTED TRAFFIC CONTROLLING SYSTEM AND METHOD FOR NETWORK DATA



(57) Abstract: A distributed gateway (310) represented in the figure for controlling computer network data traffic dynamically reconfigures traffic assignments among multiple gateway machines (302, 304, 306, 308) for increased network availability. If one of the distributed gateway machines becomes unavailable, traffic assignments are moved among the multiple machines such that network availability is substantially unchanged. The machines of the distributed gateway form a cluster (310) and communicate with each other using a Group Membership protocol word such that automatic, dynamic traffic assignment reconfiguration occurs in response to machines being added and deleted from the cluster, with no loss in functionality for the gateway overall, in a process that is transparent to network users, thereby providing a distributed gateway functionality that is scalable. Operation of the distributed gateway remains consistent as machines are added and deleted from the cluster. A scalable, distributed, highly available, load balancing network gateway is thereby provided, having multiple machines that function as a front server layer (310) between the network (314) and a back-end server layer (316,318) having multiple machines functioning as Web file servers, FTP servers, or other application servers. The front layer machines (302,304,306,308) comprise a server cluster that performs fail-over and dynamic load balancing for both server layers.

WO 01/35601 A1

31/3/34 (Item 34 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00749596 **Image available**
DISTRIBUTED SERVER CLUSTER FOR CONTROLLING NETWORK TRAFFIC
GROUPE DE SERVEURS DISTRIBUES POUR LE CONTROLE DU TRAFIC DE RESEAU
Patent Applicant/Assignee:
RAINFINITY INC, Suite 200, 87 N. Raymond Avenue, Pasadena, CA 91103, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
BRUCK Jehoshua, 5657 Bramblewood Road, La Canada, CA 91011, US, US (Residence), US (Nationality), (Designated only for: US)
BOHOSSIAN Vasken, 1127 E. Del Mar Boulevard #227, Pasadena, CA 91106, US, US (Residence), CA (Nationality), (Designated only for: US)
FAN Chenggong, 1155 E. Del Mar Boulevard #105, Pasadena, CA 91106, US, US (Residence), CN (Nationality), (Designated only for: US)
LEMAHIEU Paul, 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106, US, US (Residence), US (Nationality), (Designated only for: US)
LOVE Philip, 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106, US, US (Residence), GB (Nationality), (Designated only for: US)
Legal Representative:
HALL David A (et al) (agent), Heller Ehrman White & McAuliffe LLP, Suite 700, 4250 Executive Square, La Jolla, CA 92037, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200062502 A2-A3 20001019 (WO 0062502)
Application: WO 2000US9861 20000412 (PCT/WO US0009861)
Priority Application: US 99128872 19990412; US 99437637 19991110
Parent Application/Grant:
Related by Continuation to: US 99437637 19991110 (CIP); US 99128872 19990412 (CIP)

RELATED DOC. BENEATH

Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ EE ES
FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU
LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT
TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 23312

US006801949B1

(12) United States Patent
Bruck et al.

(10) Patent No.: US 6,801,949 B1
(45) Date of Patent: Oct. 5, 2004

(54) DISTRIBUTED SERVER CLUSTER WITH GRAPHICAL USER INTERFACE

(75) Inventors: **Jehoshua Bruck**, La Canada, CA (US); **Vasken Bohossian**, Pasadena, CA (US); **Chenggong Charles Fan**, Fremont, CA (US); **Paul LeMahieu**, Pasadena, CA (US); **Philip Love**, Pasadena, CA (US)

(73) Assignee: **Rainfinity, Inc.**, Mountain View, CA (US)

(21) Appl. No.: **09/566,592**

(22) Filed: **May 8, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/548,188, filed on Apr. 12, 2000, which is a continuation of application No. 09/437,637, filed on Nov. 10, 1999.

(60) Provisional application No. 60/128,872, filed on Apr. 12, 1999.

(51) **Int. Cl.**[7] **G06F 15/16**

(52) **U.S. Cl.** **709/232**; 709/234; 709/238

(58) **Field of Search** 709/232, 234, 709/235, 238–242, 220, 221, 102, 103, 105; 370/229

(56) **References Cited**

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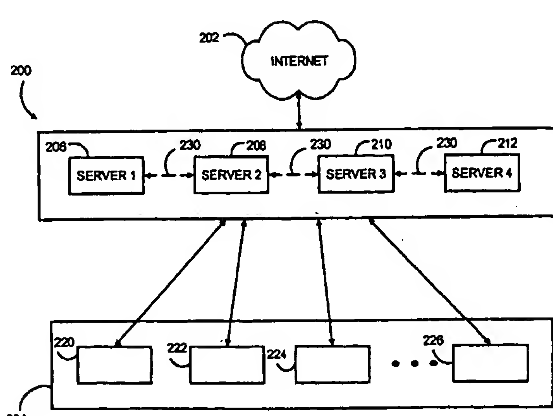
(List continued on next page.)

Primary Examiner—Frantz B. Jean
(74) *Attorney, Agent, or Firm*—Heller Ehrman White & McAuliffe

(57) **ABSTRACT**

A scalable, distributed, highly available, load balancing server system having multiple machines is provided that functions as a front server layer between a network (such as the Internet) and a back-end server layer having multiple machines functioning as Web file servers, FTP servers, or other application servers. The front layer machines comprise a server cluster that performs fail-over and dynamic load balancing for both server layers. The operation of the servers on both layers is monitored, and when a server failure at either layer is detected, the system automatically shifts network traffic from the failed machine to one or more operational machines, reconfiguring front-layer servers as needed without interrupting operation of the server system. The server system automatically accommodates additional machines in the server cluster, without service interruption. The system operates with a dynamic reconfiguration protocol that permits reassignment of network addresses to the front layer machines. The front layer machines perform their operations without breaking network communications between clients and servers, and without rebooting of computers.

8 Claims, 38 Drawing Sheets



31/3/35 (Item 35 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00522063 **Image available**
DISTRIBUTED PROCESSING OVER A NETWORK
TRAITEMENT REPARTI DANS UN RESEAU
Patent Applicant/Assignee:
  HEWLETT-PACKARD COMPANY,
  WOLFF James J,
Inventor(s):
  WOLFF James J,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 9953415 A1 19991021
  Application: WO 99US8169 19990414 (PCT/WO US9908169)
  Priority Application: US 9860924 19980415; US 9860869 19980415; US 9860857 19980415; US 9860864 19980415

RELATED Doc. BENEATH

Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
  AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG US US US US UZ VN YU ZA ZW GH GM KE LS MW SD SL SZ UG ZW AM AZ BY KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 49788

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 17/00	A1	(11) International Publication Number: WO 99/53415 (43) International Publication Date: 21 October 1999 (21.10.99)

(21) International Application Number: PCT/US99/08169

(22) International Filing Date: 14 April 1999 (14.04.99)

(30) Priority Data:

09/060,924	15 April 1998 (15.04.98)	US
09/060,869	15 April 1998 (15.04.98)	US
09/060,857	15 April 1998 (15.04.98)	US
09/060,864	15 April 1998 (15.04.98)	US

(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Applications

US	09/060,924 (CIP)
Filed on	15 April 1998 (15.04.98)
US	09/060,869 (CIP)
Filed on	15 April 1998 (15.04.98)
US	09/060,857 (CIP)
Filed on	15 April 1998 (15.04.98)
US	09/060,864 (CIP)
Filed on	15 April 1998 (15.04.98)

(71) Applicant *(for all designated States except US)*: HEWLETT-PACKARD COMPANY [US/US]; P.O. Box 10301, Palo Alto, CA 94303-0890 (US).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: WOLFF, James, J. [US/US]; 2611 Borton Drive, Santa Barbara, CA 93109 (US).

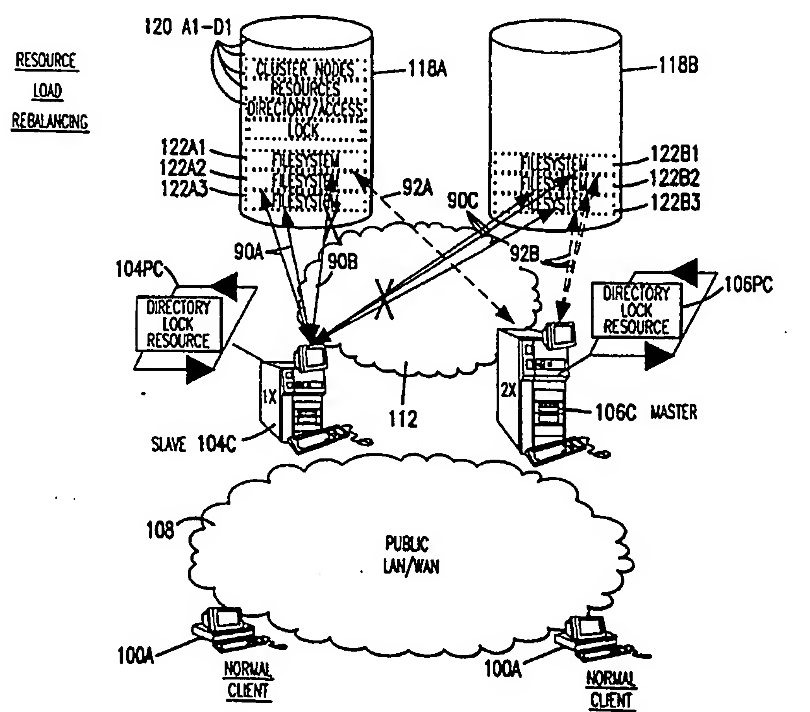
(74) Agent: HARTNETT, Clare; Hewlett-Packard Company, P.O. Box 10301, Palo Alto, CA 94303-0890 (US).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: DISTRIBUTED PROCESSING OVER A NETWORK

(57) Abstract



Methods and apparatus for operating a network with clustered resources are disclosed: including clustered file management for network resources, client load balancing, resource balancing and distributed Input and Output (I/O). Client load rebalancing refers to the ability of a client in accordance with the current invention to remap a path through a plurality of nodes to a resource. Client load rebalancing allows the client (100A) to optimize throughout between themselves and the resources accessed by the nodes. A network which implements this embodiment of the invention can dynamically rebalance itself to optimize throughout by migrating client I/O requests from overutilized pathway to underutilized pathways. Resources can include but are not limited to computers, memory devices, imaging devices, printers and data sets. A data set can include a database or a file system for example. Resource rebalancing includes remapping of pathways between nodes, servers, and resources; volume/file systems. Resource rebalancing allows the network to reconfigure itself as components come on-line/off-line, as components fail and as components fail back. Distributed I/O refers to the methods on a network which provide concurrent input/out throughout a plurality of nodes to resources. Generally by allowing one server to handle the administrative management of a resource while allowing all servers including the administrative server to handle the actual passing of all data associated with the I/O request allows for increased bandwidth between clients (100A) and the resource.

```
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             TION?
S2     805063   WORKSTATION? OR WORK()STATION? OR SERVER? OR DATAPROCESS? -
             OR MICROPROCESS? OR CENTRALPROCESS? OR (DATA OR MICRO OR CENT-
             RAL)()PROCESS?
S3   10609482   MASTER? OR CONTROL? OR COMMAND? OR SUPERVIS? OR MANAGER? OR
              MANAGEMENT? OR LEADER? OR HEAD? OR (TASK? OR JOB OR JOBS OR -
             WORK? OR LOAD?)(2N)(ALLOCAT? OR DISTRIB? OR DELEGAT? OR PARCE-
             L? OR METE? OR BALANC?)
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S8          0   S5 AND S7
S9       3629   S6 OR S8
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S15       144   S13:S14
S16         2   S9 AND S1:S2(5N)((PARTICIPAT? OR GROUP? OR CLUB? OR OVERLA-
             P? OR IMBRICAT? OR MEMBER? OR (TAKE? OR TAKING)()PART OR PART-
             AK? OR COOPERAT?)(5N)(INDEX? OR INDICES? OR FACTOR? OR VALUE?
             OR QUOTI? OR QUOTA? OR GUIDE? OR SCALE? OR INDICATOR?))
S17       186   S9 AND S1:S2(5N)(OPTIMAL? OR OPTIMUM? OR OPTIMIZ? OR OPTIM-
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             OUTPUT? OR THRUPUT? OR THROUGHPUT?))
S18       328   S9 AND S1:S2(5N)(COMBINAT? OR COLLECT? OR CLUSTER? OR AGGR-
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S19       271   S9 AND S1:S2(5N)(PLURAL? OR MULTIP? OR MULTIT? OR ASSORTME-
             NT? OR ARRAY? OR POOL?)
S20       253   S9 AND S1:S2(5N)(PAIR? OR 2ND OR SECOND? OR DUAL? OR TWIN -
             OR DOUBL? OR DUPLE? OR TANDEM? OR PARALLEL?)
S21       211   S9 AND S1:S2(5N)(TWO OR BOTH)
S22        66   S17 AND S18:S21
S23       221   S12 OR S15 OR S16 OR S22
S24       163   S23 AND PY<2001
S25       138   RD (unique items)
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File   6:NTIS 1964-2005/May W2
         (c) 2005 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2005/May W2
         (c) 2005 Elsevier Eng. Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2005/May W2
         (c) 2005 Inst for Sci Info
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File  62:SPIN(R) 1975-2005/Feb W4
         (c) 2005 American Institute of Physics
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File  65:Inside Conferences 1993-2005/May W3
         (c) 2005 BLDSC all rts. reserv.
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         (c)2005 Japan Science and Tech Corp(JST)
File  95:TEME-Technology & Management 1989-2005/Apr W1
         (c) 2005 FIZ TECHNIK
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         (c) 2005 The HW Wilson Co.
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         (c) 2005 Info.Sources Inc
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
?
```

25/3,K/3 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC

6889584 INSPEC Abstract Number: C2001-05-5630-009
Title: Analytical and experimental evaluation of cluster **-based** network servers
Author(s): Bianchini, R.; Carrera, E.V.
Author Affiliation: Dept. of Comput. Sci., Rutgers Univ., Piscataway, NJ, USA
Journal: World Wide Web vol.3, no.4 p.215-29
Publisher: Kluwer Academic Publishers,
Publication Date: 2000 Country of Publication: Netherlands
CODEN: WWWEFF ISSN: 1386-145X
SICI: 1386-145X(2000)3:4L.215:AEEC;1-1
Material Identity Number: H400-2001-001
Language: English
Subfile: C

Title: Analytical and experimental evaluation of cluster **-based** network servers
Abstract: Uses analytic modeling and simulation to evaluate **network servers** implemented on clusters of **workstations** . More **specifically** , we model the potential benefits of locality-conscious request distribution within the cluster and evaluate the performance of a **cluster** -based **server** called L2S (Locality and **Load - balancing Server**) that we designed in light of our experience with the model. Our most important modeling results show that locality-conscious distribution on a 16- **node cluster** can **increase server throughput** with respect to a locality-oblivious server by up to 5-fold, depending on the...

... throughput that is within 28% of the full potential of locality-conscious distribution on 16 **nodes** , outperforming and significantly outscaling the **best** -known locality-conscious **server** . Based on our results and on the fact that the files serviced by **network** servers are becoming larger and more numerous, we conclude that our locality-conscious **network** server should prove very useful for its performance, scalability and availability properties.
Descriptors: **network** servers...

... **workstation clusters**
Identifiers: **cluster** -based **network server** performance evaluation...

... **workstation clusters** ; ...

...Locality and **Load - balancing Server** ; ...
...locality-conscious **network** server
2000

25/3,K/5   (Item 5 from file: 2)
DIALOG(R)File   2:INSPEC

6722345   INSPEC Abstract Number: C2000-11-5630-010
Title: Evaluating cluster **-based** network servers
Author(s): Carrera, E.V.; Bianchini, R.
Author Affiliation: Dept. of Comput. Sci., Rutgers Univ., Piscataway, NJ, USA
Conference Title: Proceedings the Ninth International Symposium on High-Performance Distributed Computing   p.63-70
Publisher: IEEE Comput. Soc, Los Alamitos, CA, USA
Publication Date: 2000 Country of Publication: USA   xi+316 pp.
ISBN: 0 7695 0783 2   Material Identity Number: XX-2000-01982
U.S. Copyright Clearance Center Code: 1082-8907/2000/$10.00
Conference Title: Proceedings the Ninth International Symposium on High-Performance Distributed Computing
Conference Sponsor: IEEE Comput. Soc Tech. Committee on Distributed Process.; Univ. Arizona ECE Dept
Conference Date: 1-4 Aug. 2000   Conference Location: Pittsburgh, PA, USA
Language: English
Subfile: C

Title: Evaluating cluster **-based** network servers
Abstract: Uses analytic modeling and simulation to evaluate **network servers** implemented on clusters of **workstations** . More **specifically** , we model the potential benefits of locality-conscious request distribution within the cluster and evaluate the performance of a **cluster** -based **server** called L2S (Locality and **Load - balancing Server**) which we designed in light of our experience with the model. Our most important modeling results show that locality-conscious distribution on a 16- **node cluster** can **increase server throughput** with respect to a locality-oblivious server by up to seven-fold, depending on the...

... throughput that is within 22% of the full potential of locality-conscious distribution on 16 **nodes** , outperforming and significantly outscaling the **best** -known locality-conscious **server** . Based on our results and on the fact that the files serviced by **network** servers are becoming larger and more numerous, we conclude that our locality-conscious **network** server should prove very useful for its performance, scalability and availability.
Descriptors: **network** servers...

... **workstation clusters**
Identifiers: **cluster** -based **network servers** ; ...
... **workstation clusters** ; ...

...Locality and **Load - balancing Server** ;
2000

SAME AS PREVIOUS - BETTER DATING

25/3,K/6 (Item 6 from file: 2)
DIALOG(R)File 2:INSPEC

6715741 INSPEC Abstract Number: B2000-11-6210L-043, C2000-11-5620W-020
Title: An architecture for wide area network **load balancing**
Author(s): Jingsha He
Author Affiliation: Fujitsu Labs. of America Inc., Sunnyvale, CA, USA
Conference Title: 2000 IEEE International Conference on Communications. ICC 2000. Global Convergence Through Communications. Conference Record Part vol.2 p.1169-73 vol.2
Publisher: IEEE, Piscataway, NJ, USA
Publication Date: 2000 Country of Publication: USA 3 vol. xxxii+1814 pp.
ISBN: 0 7803 6283 7 Material Identity Number: XX-2000-01513
U.S. Copyright Clearance Center Code: 0 7803 6283 7/2000/$10.00
Conference Title: Proceedings of IEEE International Conference on Communications
Conference Date: 18-22 June 2000 Conference Location: New Orleans, LA, USA
Language: English
Subfile: B C

Title: An architecture for wide area network **load balancing**
Abstract: We present a wide area **network** (**WAN**) load balancing architecture in this paper. This architecture provides a high degree of reliability, availability, flexibility and scalability. The scalability allows any number of **load balancing servers** to be deployed in a **network** . The reliability and **availability** allows the **load balancing servers** to be deployed anywhere in the **network** . The flexibility allows **server selection** to be applied to individual packets as well as to user sessions dynamically. In addition, this architecture supports a flexible way of **selecting** the **load balancing servers** to achieve desired performance. We also compare our architecture with some of the previous work to illustrate it advantages, effectiveness and practicality in fulfilling the requirements of **WAN** load balancing.
Descriptors: computer **network** reliability...

... **network** servers...

...wide area **networks**
Identifiers: wide area **network** load balancing architecture...

... **WAN** load balancing architecture...

... **network** reliability...
... **network** availability...

... **network** scalability...

... **load balancing servers** ; ...

... **server selection** ;
2000

25/3,K/8 (Item 8 from file: 2)
DIALOG(R)File 2:INSPEC

6615066 INSPEC Abstract Number: B2000-07-6210L-109, C2000-07-6150N-055
Title: **A fuzzy based** load balancing **architecture for** multiple **Web** servers
Author(s): Li Lei; Pan Yong; Shi Hongbao
Author Affiliation: Inst. of Comput. Technol., Shanghai Tiedao Univ., China
Conference Title: Fifth International Conference for Young Computer Scientists. ICYCS'99. Advances in Computer Science and Technology Part vol.1 p.449 vol.1
Editor(s): Luo, J.; Xu, B.; Wang, Y.; Li, X.; Lu, J.
Publisher: Int. Acad. Publishers, Beijing, China
Publication Date: 1999 Country of Publication: China 2 vol. xxii+1083 pp.
ISBN: 7 80003 445 3 Material Identity Number: XX-1999-02578
Conference Title: Proceedings of ICYCS'99: Fifth International Conference for Young Computer Scientists
Conference Sponsor: China Comput. Federation; Nat. Natural Sci. Found. China; K C Wong Educ. Found.; et al
Conference Date: 17-20 Aug. 1999 Conference Location: Nanjing, China
Language: English
Subfile: B C

Title: **A fuzzy based** load balancing **architecture for** multiple **Web** servers
Abstract: Summary form only given. The explosive growth of the **Internet** has put a tremendous pressure on servers. Overloaded Web servers may cause clients to spend...

... and to provide fast response to user requests for information and services, Web sites deploy **multiple** Web **servers** . This paper is focused on how to **select** the **best** **server** , whose load is the lowest of all, for the clients. This is one kind of...
...Descriptors: **computer** **network** **management** ; ...

... **Internet** ;
...Identifiers: **multiple** Web **servers** ; ...

... **Internet** ; ...

... **server** **selection** method...

... **World** **Wide** **Web**
1999

25/3,K/9 (Item 9 from file: 2)
DIALOG(R)File 2:INSPEC

6610718 INSPEC Abstract Number: C2000-07-6160B-018
Title: Transaction multicasting scheme for resilient routing control in parallel cluster database systems
Author(s): Inhwan Jung; Sonchung Moon
Author Affiliation: Database Syst. Lab., Korea Adv. Inst. of Sci. & Technol., Seoul, South Korea
Journal: Journal of Systems Architecture vol.46, no.8 p.699-719
Publisher: Elsevier,
Publication Date: June 2000 Country of Publication: Netherlands
CODEN: JSARFB ISSN: 1383-7621
SICI: 1383-7621(200006)46:8L.699:TMSR;1-F
Material Identity Number: D362-2000-006
U.S. Copyright Clearance Center Code: 1383-7621/2000/$20.00
Language: English
Subfile: C

...Abstract: performance transaction processing in which the computing nodes are locally coupled via a high-speed **network** and share a common database at the disk level. In the DCE, it is crucial...
... The aim of disk sharing in DCE is not only to achieve high performance by **distributing** the **workload** among the processing **nodes** but also to obtain fault-tolerance against possible system failures, like a single node failure...

... the routing information dynamically, the routing algorithm sends multiple clones of a transaction to a **group** of candidate processing **nodes** and **selects** the processing **node** that first completes the multicasted transaction as a new processing **node** for re-routed transaction. The **selected** processing **node** is expected to be a best affinity **node** when the system **load** is evenly **distributed** , or a relatively unloaded processing **node** that is idle enough to process a transaction faster than other nodes. The novel aspect...
2000

25/3,K/15 **(Item 15 from file: 2)**
DIALOG(R)File 2:INSPEC

5930589 INSPEC Abstract Number: B9807-6210L-053, C9807-5620-018
Title: **Traffic** control **for** server **overload and** network **congestion by dynamic multi-server system**
Author(s): Matsumura, R.; Yoshino, H.; Horigome, H.; Miwa, H.
Journal: NTT Review vol.10, no.2 p.58-62
Publisher: NTT,
Publication Date: March 1998 Country of Publication: Japan
CODEN: NTTREK ISSN: 0915-2334
SICI: 0915-2334(199803)10:2L.58:TCSO;1-U
Material Identity Number: N570-98002
Language: English
Subfile: B C

Title: **Traffic** control **for** server **overload and** network **congestion by dynamic multi-server system**
Abstract: This paper proposes a system that reduces traffic congestion in **specific** **servers** and in a **specific** **network** and allows clients to get their desired contents quickly, even if there is heavy traffic on some servers. It does this by distributing contents to **multiple** shared **servers** and navigating the clients to the **optimal** **servers** **.**
...Descriptors: **network** servers
...Identifiers: **network** congestion...

... **multiple** shared **servers** ; ...

... **optimal** **servers** ;
1998

25/3,K/81 (Item 4 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

05671343 E.I. No: EIP00105353848
Title: Architecture for wide area network **load balancing**
Author: He, Jingsha
Corporate Source: Fujitsu Lab of America, Inc, Sunnyvale, CA, USA
Conference Title: 2000 IEEE International Conference on Communications
Conference Location: New Orleans, LA, USA Conference Date: 19000618-19000622
E.I. Conference No.: 57404
Source: IEEE International Conference on Communications v 2 2000. IEEE, Piscataway, NJ, USA,00CB37097. p 1169-1173
Publication Year: 2000
CODEN: 002115
Language: English

Title: Architecture for wide area network **load balancing**
Abstract: We present a wide area **network** (**WAN**) load-balancing architecture in this paper. This architecture provides a high degree of reliability, availability, flexibility and scalability. The scalability allows any number of **load - balancing servers** to be deployed in a **network** . The reliability and **availability** allows the **load - balancing servers** to be deployed anywhere in the **network** . The flexibility allows **server selection** to be applied to individual packets as well as to user sessions dynamically. In addition, this architecture supports a flexible way of **selecting** the **load - balancing servers** to achieve desired performance. We also compare our architecture with some of the previous work to illustrate it advantages, effectiveness and practicality in fulfilling the requirements of **WAN** load balancing. (Author abstract) 7 Refs.
Descriptors: *Mobile radio systems; Wide area **networks** ; Computer architecture
Identifiers: **Load balancing servers**

25/3,K/83 **(Item 6 from file: 8)**
DIALOG(R)File 8:Ei Compendex(R)

05576936 E.I. No: EIP00065201391
Title: Transaction multicasting scheme for resilient routing control in parallel cluster database systems
Author: Jung, Inhwan; Moon, Sonchung
Corporate Source: Korea Advanced Inst of Science and Technology, Seoul, South Korea
Source: Journal of Systems Architecture v 46 n 8 2000. p 699-719
Publication Year: 2000
CODEN: JSARFB ISSN: 1383-7621
Language: English

...Abstract: performance transaction processing in which the computing nodes are locally coupled via a high-speed **network** and share a common database at the disk level. In the DCE, it is crucial...

...The aim of disk sharing in DCE is not only to achieve high performance by **distributing** the **workload** among the processing **nodes** but also to obtain fault-tolerance against possible system failures, like a single node failure...

...the routing information dynamically, the routing algorithm sends multiple clones of a transaction to a **group** of candidate processing **nodes** and **selects** the processing **node** that first completes the multicasted transaction as a new processing **node** for re-routed transaction. The **selected** processing **node** is expected to be a best affinity **node** when the system **load** is evenly **distributed** , or a relatively unloaded processing **node** that is idle enough to process a transaction faster than other nodes. The novel aspect...

25/3,K/105 **(Item 2 from file: 35)**
DIALOG(R)File 35:Dissertation Abs Online

01432331 ORDER NO: AADAA-I9530999
MANAGEMENT **OF** NETWORKED WORKSTATIONS **AS A** PARALLEL **MACHINE FOR THE SOLUTION OF OPTIMIZATION**
Author: MAYER, MARGARET KING
Degree: PH.D.
Year: **1995**
Corporate Source/Institution: LEHIGH UNIVERSITY (0105)
Source: VOLUME 56/05-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 2804. 127 PAGES

MANAGEMENT **OF** NETWORKED WORKSTATIONS **AS A** PARALLEL **MACHINE FOR THE SOLUTION OF OPTIMIZATION**
Year: **1995**

Utilizing **networked** **workstations** to solve **optimization** problems in **parallel** provides the opportunity to improve algorithm performance without the use of special purpose hardware. Although several general purpose software applications have been written which encapsulate the **network** protocols, such packages do not provide any guidance for the management of the parallel program...
...studying parallel architectures and algorithms instead of solving problems.

This work introduces a parallel algorithm **manager** which automatically manages **networked** **workstations** for **optimization** problems. **Workstations** are **selected** dynamically during startup based on idleness, to provide the greatest amount of collective computing power...

...and a parallel genetic algorithm using the algorithm manager are presented. Performance of the algorithm **manager** under various **cpu** loads and **network** traffic is reported.

25/3,K/106   (Item 3 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01306030 ORDER NO: AAD93-23846
A RECURSIVE ALGORITHM FOR MULTI-OBJECTIVE NETWORK **OPTIMIZATION WITH TIME-VARIANT LINK-COSTS (PRODUCTION CONTROL, DYNAMIC PROGRAMMING)**
Author: GETACHEW, TEODROS
Degree: PH.D.
Year: **1992**
Corporate Source/Institution: CLEMSON UNIVERSITY (0050)
Source: VOLUME 54/04-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1453. 135 PAGES

A RECURSIVE ALGORITHM FOR MULTI-OBJECTIVE NETWORK **OPTIMIZATION WITH TIME-VARIANT LINK-COSTS (PRODUCTION CONTROL, DYNAMIC PROGRAMMING)**
Year: **1992**
Descriptors: BUSINESS ADMINISTRATION, **MANAGEMENT** ; MATHEMATICS; **COMPUTER** SCIENCE; OPERATIONS RESEARCH

...the classical shortest-path problem. The first is an extension to finding optimal paths in **networks** whose links have time-dependent costs, while the second is concerned with the establishment of algorithms to find all non-dominated paths through a **network** with vector-valued costs. Recent work has shown that the adequate analysis of some important...
...both of these advances.

An algorithm that solves the following problem is established. Let a **network** whose links have vector-valued, time-dependent costs be given. Suppose a **distinguished** **node** , called the destination **node** is **selected** . Find all non-dominated paths from all nodes to the destination node. Apart from satisfying...

```
Set     Items   Description
S1   10630155   NODE? OR HUB OR HUBS OR CPU OR CPUS OR COMPUTER? OR SUBSTA-
             TION?
S2    3259666   WORKSTATION? OR WORK()STATION? OR SERVER? OR DATAPROCESS? -
             OR MICROPROCESS? OR CENTRALPROCESS? OR (DATA OR MICRO OR CENT-
             RAL)()PROCESS?
S3   10249481   MASTER? OR CONTROL? OR COMMAND? OR SUPERVIS?
S4   22798966   MANAGER? OR MANAGEMENT? OR LEADER? OR HEAD?
S5   17389261   TARGET? OR SELECT? OR CHOSEN? OR SPECIFIC? OR DESIGNAT? OR
             NAMED? OR PARTICULAR?
S6      94691   S1:S2(5N)S3:S4 AND S1:S2(5N)S5
S7      63090   S6 AND (NETWORK? OR LAN OR WAN OR ETHERNET?)
S8      38525   S6 AND (INTERNET? OR INTRANET? OR WORLD()WIDE()WEB)
S9      70811   S7:S8
S10      2033   S9 AND S1:S2(5N)(HAMMING()DISTANC? OR UNCOMMON? OR DISTING-
             UISH? OR DISTINCTION? OR DIFFERENCE?)
S11       170   S9 AND S1:S2(5N)(UNALLIE? OR (NON OR "NOT")(2W)(ALLIE? OR -
             OVERLAPPING? OR GROUP? OR SHARE? OR SHARING? OR COMMON OR PAR-
             TICIPAT?))
S12     18197   S9 AND S1:S2(5N)(AVAILAB? OR FREE OR ON()(DECK OR HAND) OR
             UNOCCUP? OR UNCOMMIT? OR UNDEDICAT?)
S13       656   S9 AND S1:S2(5N)(NON OR "NOT")(2W)(OCCUP? OR COMMIT? OR DE-
             DICAT? OR USE OR BEING()USED)
S14     13283   S9 AND S1:S2(5N)(PARTICIPAT? OR GROUP? OR CLUB? OR OVERLAP?
              OR IMBRICAT? OR MEMBER? OR (TAKE? OR TAKING)()PART OR PARTAK?
              OR COOPERAT?)
S15      9364   S9 AND S1:S2(5N)(OPTIMAL? OR OPTIMUM? OR OPTIMIZ? OR OPTIM-
             IS? OR SUPERLAT? OR BEST OR MOST()(FAVORAB? OR ADVANTAG? OR E-
             FFICIENT?) OR SHORTEST? OR (INCREAS? OR FAST? OR QUICK?)(2N)(-
             OUTPUT? OR THRUPUT? OR THROUGHPUT?))
S16       621   S10:S11 AND S12:S13 AND S14:S15
S17       145   S16 AND S14 AND S15
S18       360   S16 AND S15
S19       145   S17 AND S18
S20       124   S19 AND PY<2001
S21        83   RD (unique items)
? show files
File   9:Business & Industry(R) Jul/1994-2005/May 16
         (c) 2005  The Gale Group
File  13:BAMP 2005/May W2
         (c) 2005  The Gale Group
File  15:ABI/Inform(R) 1971-2005/May 16
         (c) 2005 ProQuest Info&Learning
File  16:Gale Group PROMT(R) 1990-2005/May 16
         (c) 2005 The Gale Group
File  88:Gale Group Business A.R.T.S. 1976-2005/May 16
         (c) 2005 The Gale Group
File  98:General Sci Abs/Full-Text 1984-2004/Dec
         (c) 2005 The HW Wilson Co.
File 148:Gale Group Trade & Industry DB 1976-2005/May 17
         (c)2005 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 239:Mathsci 1940-2005/Jun
         (c) 2005 American Mathematical Society
File 275:Gale Group Computer DB(TM) 1983-2005/May 17
         (c) 2005 The Gale Group
File 369:New Scientist 1994-2005/Apr W2
         (c) 2005 Reed Business Information Ltd.
File 370:Science 1996-1999/Jul W3
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         (c) 2005 ProQuest
File 553:Wilson Bus. Abs. FullText 1982-2004/Dec
         (c) 2005 The HW Wilson Co
File 610:Business Wire 1999-2005/May 17
         (c) 2005 Business Wire.
File 613:PR Newswire 1999-2005/May 17
         (c) 2005 PR Newswire Association Inc
File 621:Gale Group New Prod.Annou.(R) 1985-2005/May 16
         (c) 2005 The Gale Group
File 634:San Jose Mercury  Jun 1985-2005/May 16
         (c) 2005 San Jose Mercury News
File 635:Business Dateline(R) 1985-2005/May 14
         (c) 2005 ProQuest Info&Learning
File 636:Gale Group Newsletter DB(TM) 1987-2005/May 16
         (c) 2005 The Gale Group
File 647:CMP  Computer Fulltext 1988-2005/May W1
         (c) 2005 CMP Media, LLC
File 674:Computer News Fulltext 1989-2005/May W3
         (c) 2005 IDG Communications
File 696:DIALOG Telecom. Newsletters 1995-2005/May 16
         (c) 2005 The Dialog Corp.
File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
File 813:PR Newswire 1987-1999/Apr 30
         (c) 1999 PR Newswire Association Inc
?
```

21/3,K/22 (Item 1 from file: 88)

05757735 SUPPLIER NUMBER: 74089508
Process Migration.
MILOJICIC, DEJAN S.; DOUGLIS, FRED; PAINDAVEINE, YVES; WHEELER, RICHARD; ZHOU, SONGNIAN
ACM Computing Surveys, 32, 3, 241
Sept, 2000
ISSN: 0360-0300 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 35798 LINE COUNT: 03044

... both in research and in product development. As high-performance facilities shift from supercomputers to **Networks** of Workstations (NOW) (Anderson et al., 1995) and large-scale distributed systems, we expect migration...

...techniques originally developed for process migration have been employed in developing mobile agents on the **World Wide Web** . Recent interpreted programming languages, such as Java (Gosling et al., 1996), Telescript (White, 1996) and...act on the owner's behalf on a wide scale, such as within the entire **Internet** .

(Figure 2 ILLUSTRATION OMITTED)

2.2. Target Architectures

Process migration research started with the appearance...

...i.e., there is no remote memory access. In that respect they are similar to **network** clusters, except they have a much faster interconnect. Migration represents a convenient tool to achieve...

...on Cray T3E, or Loadleveler on IBM SP2 machines.

Since its inception, a Local Area **Network** (**LAN**) of computers has been the most frequently used architecture for process migration. The bulk of...

...LANs. It was observed that at any point in time many autonomous workstations on a **LAN** are unused, offering potential for other users based on process migration (Mutka and Livny, 1987). There is, however, a sociological aspect to the autonomous **workstation** model. Users are **not** willing to **share** their **computers** with others if this means affecting their own performance (Douglis and Ousterhout, 1991). The priority1991; Krueger and Chawla, 1991).

Most recently, wide-area **networks** have presented a huge potential for migration. The evolution of the Web has significantly improved the relevance and the opportunities for using a wide-area **network** for distributed computing. This has resulted in the appearance of mobile agents, entities that freely roam the **network** and represent the user in conducting his tasks. Mobile agents can either appear on the **Internet** (Johansen et al., 1995) or in closed **networks** , as in the original version of Telescript (White, 1996).

2.3. Goals

The goals of...

...Migration is particularly important in the receiver-initiated distributed scheduling algorithms, where a lightly loaded **node** announces its **availability** and initiates process migration from an overloaded node. This was the goal of many systems...

...and 2.8). A variation of this goal is harnessing the computing power of

temporarily **free workstations** in large clusters. In this case, process migration is used to evict processes upon the...

...al. (1993), and Miller and Presotto (1981).

Resource sharing is enabled by migration to a **specific node** with a special hardware device, large amounts of free memory, or some other unique resource...

...failed node, or in the case of long-running applications when failures of different kinds (**network** , devices) are probable (Chu et al., 1980). In this context, migration can be used in...

...migrate running applications from a host to their mobile computer as they connect to a **network** at their current location or back again when they disconnect (Bharat and Cardelli, 1995).

2...represent this class of application. They are described in more detail in Section 4.6.

Network applications are the most recent example of the potential use of migration: for instance, mobile...specified criteria. Where to migrate depends on the location policy algorithm, which chooses a remote **node** based on the **available** information.

There are a few well-known classes of distributed scheduling policies:

* A sender-initiated...with the scheduling impact on system behavior (Stankovic, 1984). Based on the current host and **network** load, the relative importance of load parameters may change. The policy should adapt to these...

...its lifetime.

* Hierarchical scheduling integrates distributed and centralized scheduling. It supports distributed scheduling within a **group** of **nodes** and centralized scheduling among the **groups** . This area has attracted much research (Bowen et al., 1988; Bonomi and Kumar, 1988; Feitelson...

...mechanism is a good fit for hierarchical scheduling since processes are typically migrated within a **LAN** or other smaller domain. Only in the case of large load discrepancies are processes migrated...

...of remote execution are overestimated: there are no associated costs and no affinity toward a **particular node** . Harchol-Balter and Downey model a **network** of workstations where remote execution entails costs, and there exists an affinity toward some of...not have to support OS semantics. Performance requirements are different due to the wide-area **network** communication cost, which is the dominant factor. Heterogeneity is abstracted away at the language level...much of their functionality from the kernel into user space. For example, file servers and **networking** may be implemented in user space, leaving only a minimal subset of functionality provided in...

...1985) and Locus (Popek and Walker, 1985).

* The Copy-On-Reference (COR) strategy is a **network** version of demand paging: pages are transferred only upon reference. While dirty pages are brought...time is reduced to 13.9ms running on a SparcStation II connected by a 10Mb **Ethernet** , which is an order of magnitude better than all other reported results, even if results...lazily resolving communication channels). Residual dependencies are of concern for long-running applications and for **network** applications. Applications with real-time requirements generally are not suitable candidates for residual dependency because...

...transparent process migration (Douglis and Ousterhout, 1991).

Scientific applications (typically long-running), as well as **network** applications are concerned with failure tolerance. In most cases periodic checkpointing of the state suffices...

...large address spaces, and a large number of communication channels. It is also important for **network** applications, especially those at the **Internet** scale.

Heterogeneity introduces performance penalties and additional complexity. It is of most concern to **network** applications which typically run on inhomogeneous systems.

4. EXAMPLES

This section classifies process migration implementations...

...fails, other segments cooperatively reinstantiate it by locating a free machine, rebooting it from the **network** , and migrating the failed worm segment to it. A worm can move from one machine...

...replicating itself. As opposed to other migration systems, a worm is aware of the underlying **network** topology. Communication among worm segments is maintained through multicasting.

The original Butler system supports remote...on top of a single system image base (Barak and Litman, 1985) and in a **Network** of Workstations environment (Barak et al., 1995). The process migration mechanism is used to support...

...A case study of the MOSIX system is presented in Section 5.1.

The Sprite **network** operating system (Ousterhout et al., 1988) was developed from 1984-1994. Its process migration facility...

...on one host throughout their execution. Processes could access remote resources, including files, devices, and **network** connections, from different locations over time. When a user returned to a workstation onto which...

...underlying operating system and its communication mechanisms which were modified in order to support transparent **network** communication (Artsy et al., 1987). Its process migration is well insulated from other system modules...module. A microkernel supports tasks, threads, IPC and VM management, while other functionality, such as **networking** , file system and process management, is imple-mented in the OS personality. Various OS personalities...when a workstation becomes overloaded. Upon migration, the process is restarted after synchronization with processes **participating** in the application on other **nodes** . At the same time, it is possible to conduct multiple migrations. On a cluster of 20 HP-Apollo workstations connected by 10 Mbps **Ethernet** , Skordos notices approximately one migration every 45 minutes. Each migration lasts 30 seconds on average...

...object on a cluster of 4 MicroVax II workstations connected by a 10 megabit/second **Ethernet** takes about 12 ms while moving a small process takes about 40 ms. Some modest...kernels (Bernstein, 1996). Research in distributed systems has largely refocused from local to wide-area **networks** . Security is a dominant requirement for applications and systems connected to the Web. In this...

...for information retrieval and dissemination in military intelligence (Hoffman, et al., 1998). Agent Tcl is **optimized** for mobile **computers** , e.g. by minimizing connection time and communication. The TACOMA project is a joint effort...MOSIX nodes is done by process migration. Other interesting features include full autonomy of each **node** in the system,

fully-decentralized **control** , single system image, dynamic configuration and scalability.

Various versions of MOSIX have been in active...

...image. MOSIX presents a process with a uniform view of the file system, devices and **networking** facilities regardless of the process's current location.

* Autonomy of each node. Each node in the system is independent of all other **nodes** and may **selectively participate** in the MOSIX cluster or deny services to other nodes. Diskless **nodes** in MOSIX rely on a **specific node** for file services.

* Dynamic configuration. MOSIX nodes may join or leave a MOSIX cluster at any time. Processes that are not running on a **node** or using some **node specific** resource, are not affected by the loss of that node.

* Scalability. System algorithms avoid using...

...the MOSIX system is the linker, which maps universal objects into local objects on a **specific node** , and which provides internode communication, data transfer, process migration and load balancing algorithms. When the...

...other clean pages are faulted in as needed once the process resumes execution on the **target node** .

Process migration in MOSIX is a common activity. A process has no explicit knowledge about...

...actually running on or any guarantees that it will continue to run on its current **node** . The migration algorithm is **cooperative** : for a process to migrate to a **node** , the **target node** must be willing to accept it. This allows individual **nodes control** over the extent of their own contribution to the MOSIX system. Individual nodes can also...selected for migration. For example, a small process that is making heavy use of a **network** interface or file on a **specific node** would be considered for migration to that node. This profiling information is discarded when a...

...nodes in the system (Barak et al., 1989). On each iteration of the algorithm, each **node** randomly **selects** two other **nodes** , of which at least one node is known to have been recently alive. Each of the **selected nodes** is sent the most recent half of the local load vector information. In addition, when...

...its exported local load information by a stability factor. For migration to take place, the **difference** in load values between two **nodes** must exceed this stability value.

The load balancing algorithm decides to migrate processes when it...

...a history of forking off new subprocesses or have a history of communication with the **selected node** . This prevents short-lived processes from migrating.

Implementation and Performance. Porting the original version of...

...depends directly on the performance of the linker's data transfer mechanism on a given **network** and the size of the dirty address space and user area of the migrating process...

...this speedup does not apply to other types of applications (non-CPU-bound, such as **network** or I/O bound jobs). These applications may experience different speedups. No attempt has been...

...of the earlier MOSIX systems without requiring invasive kernel changes.

5.2. Sprite

The Sprite **Network** Operating System was developed at U.C. Berkeley between 1984 and 1994 (Ousterhout et al., 1988). Its primary goal was to treat a **network** of personal workstations as a time-shared computer, from the standpoint of sharing resources, but with the performance guarantees of individual workstations. It provided a shared **network** file system with a single-system image and a fully-consistent cache that ensured that...TCP connections. (TCP was served through user-level daemons contacted via pseudo-devices.) The shared **network** file system provided transparent access to files or processes from different locations over time.

As...

...not migrate.

Scalability. Sprite was designed for a cluster of workstations on a local area **network** and did not particularly address the issue of scalability. As a result, neither did the...

...All measurements in this subsection were taken on SPARCstation 1 workstations on a 10-Mbps **Ethernet** , as reported in (Douglis and Ousterhout, 1991).

1. The time to migrate a process was...

...server storing the files being read and written, and the workstation running pmake, were saturated. **Network** utilization was not a significant problem, however.

Lessons Learned. Here we summarize the two most...1993b).

Implementation and Performance. Milojicic et al. built three implementations: two user-level migrations (an **optimized** and a simple migration **server**); and a kernel implementation. The size of the simplified migration server is approximately 400 lines...

...DIPC. The DMM, which was never optimized, consists of 24,000 lines of code.

The **optimized** migration **server** is largest in size with a ... lines of code. Most of this implemented a pager supporting different data transfer strategies. The **optimized** migration **server** did not rely on in-kernel data transfer strategy, except for the support of distributed...

...Similar to Sprite, LSF employs a centralized algorithm for collecting load information. One of the **nodes** acts as the **master** , and every other **node** reports its local load to the **master** periodically. If the **master** **node** fails, another **node** immediately assumes the role of the master. The scheduling requests are directed to the **master** **node** , which uses the load information of all the **nodes** to **select** the one that is likely to provide the best performance.

Although many of the load...

...this algorithm has the advantage of making (reasonably up-to-date) load information of all **nodes** readily **available** , thus reducing the scheduling delay and considering all nodes in scheduling. Zhou et al. (1994) argue that the **network** and CPU overhead of this approach is negligible in modern computers and **networks** . Measurements and operational experience in clusters of several hundred hosts confirm this observation. Such a...load conditions remain unfavorable after this period would the suspended process be migrated to another **node** .

The **target** **node** is **selected** based on the dynamic load conditions and the resource requirements of the process. Recognizing that ...

...of resources, LSF collects a variety of load information for each node, such as average **CPU** run queue length, **available** memory and swap space,

disk paging and I/O rate, and the duration of idle...

...such as
select(sparc && swap (is greater than) = 120 && mem (is greater than) = 64) order(**cpu** : mem)
which indicates that the **selected** **node** should have a resource called "sparc," and should have at least 120 MB of swap...

...would incur low overhead (0.1 seconds as measured by Zhou et al. on a **network** of UNIX workstations (1994)).

In contrast, it is not desirable to maintain per-application connections...describes how easy it is to port the migration mechanism to another operating system or **computer** . User-space and application-**specific** implementations have superior portability. Condor and LSF run on numerous versions of operating systems and...scalability of migration and load information management. An approximate prediction is that centralized load information **management** could scale up to 500 **nodes** without hierarchical organization, such as in Sprite. With hierarchical organization, such as in LSF, it could scale beyond 2000 **nodes** . Decentralized information **management** , such as in MOSIX, can scale to an even larger number of nodes. Even though Mach task migration has not been used on larger systems than a 5-node **Ethernet** cluster, most of its components that can impact scalability (distributed IPC, distributed memory management, and...all dirty memory pages. With more wide-spread use of workstations and servers on the **network** , Platform Computing is experiencing a rapidly increasing demand for process migration.

7.2. Misconceptions

Frequently...

...become widely adopted in the commercial arena. Examples include object-orientation, multi-threading, and the **Internet** . It may be the case that process mobility is not ripe enough to be adopted...and dependent on external data. In the near future, because of the exceeding difference in **network** performance, it will be more and more relevant to execute (migrate) applications close to the...

...technology). The following hardware technology trends may impact process migration in the future: high speed **networks** , large scale systems, and the popularity of hardware mobile gadgets. With the increasing difference in **network** speeds (e.g. between a mobile **computer** and a fiber-channel), the **difference** between remote execution and migration becomes greater. Being able to move processes during execution (e...

...a simple manner.

A second path concerns clusters of workstations. Recent advances in high speed **networking** (e.g. ATM (Partridge, 1994) and Myrinet (Boden et al., 1995)) have reduced the cost...

...similar systems are sure to follow. One can imagine a process starting on a personal **computer** , and migrating its flow of **control** into another device in the same domain. Such activity would be similar to the migratory ...

...the processor pool and workstation models, the Web environment connects computers as interfaces to the " **network** -is-computer" model. The requirements for transparency are relaxed, and user-specific solutions are preferred. Performance is dominated by **network** latency and therefore state transfer is not as dominant as it is on a local area **network** ; remote access and remote ...ANDERSON, T. E., CULLER, D. E., AND PATTERSON, D. A. 1995. A Case for NOW (**Networks** of Workstations). IEEE Micro 15, 1,

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DESCRIPTORS: Process **management** (**Computers**)--...

... **Network** operating systems
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21/3,K/23 (Item 2 from file: 88)
DIALOG(R)File 88:Gale Group Business A.R.T.S.

05522259 SUPPLIER NUMBER: 64825219
Static Scheduling Algorithms for Allocating Directed Task Graphs to Multiprocessors.
KWOK, YU-KWONG; AHMAD, ISHFAQ
ACM Computing Surveys, 31, 4, 406
Dec, 1999
ISSN: 0360-0300 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 31813 LINE COUNT: 02570

... 1993); shared-memory multiprocessors (SMMs) (Hwang 1993); clusters of symmetric multiprocessors (SMPs) (Hwang 1993); and **networks** of workstations (NOWs) (Hwang 1993). Therefore, their more detailed architectural characteristics must be taken into...research in this area was pioneered by Bokhari (1979) and Stone (1977): Stone (1977) applied **network** -flow algorithms to solve the assignment problem, whereas Bokhari (1981) described the mapping problem as...sub.i) on target processor P

ST((n.sub.i), P)	The start time of **node** (n.sub.i) on **target** processor P
FT((n.sub.i), P)	The finish time of **node** (n.sub.i) on **target** processor P
VIP((n.sub.i))	The parent node of (n.sub.i) that sends...
...PE	The **target** processor from which **nodes** are migrated
Proc((n.sub.i))	The processor accommodating node (n.sub.i)
(L.sub...	

...Bounded Number of Processors	scheduling algorithms
TDB	Task Duplication Based scheduling algorithms
APN	Arbitrary Processors **Network** scheduling algorithms

The precedence constraints of a DAG dictate that a node cannot start execution...4 The Multiprocessor Model

In DAG scheduling, the target system is assumed to be a **network** of processing elements (PEs), each of which is composed of a processor and a local...

...completion times on different processors may be different. The PEs are connected by an interconnection **network** with a certain topology. The topology may be fully connected or of a particular structure...

...only for three simple cases (Coffman 1976). The first case is to schedule a uniform **node** -weight **free** -tree to an arbitrary number of processors. Hu (1961) proposed a linear-time algorithm to...

...this problem. Both Hu's algorithm and Coffman et al.'s algorithm are based on **node** -labeling methods that produce **optimal** scheduling lists leading to optimal schedules. Sethi (1976) then improved the time-complexity of Coffman...

...1993) showed that interval-ordered DAG with uniform edge weights, which are equal to the **node** weights, can also be **optimally** scheduled in polynomial time. These optimality results are summarized in Table II.

Table II. Summary...the most general model in that the system is assumed to consist of an arbitrary **network** topology, of which the links are not contention-free. These algorithms are called the APN (arbitrary processor **network**) scheduling algorithms. In addition to scheduling tasks, the APN algorithms also schedule messages on the **network** communication links. Scheduling of messages may be dependent on the routing strategy used by the underlying **network** . To optimize schedule lengths under such unrestricted environments makes the design of an APN scheduling ...

...some tasks to multiple processors. In duplication-based scheduling, different strategies can be employed to **select** ancestor **nodes** for duplication. Some of the algorithms duplicate only the direct predecessors while others try to...algorithms essentially employ the following three-step approaches:

(1) Determine new priorities of all unscheduled **nodes** ;
(2) **Select** the **node** with the highest priority for scheduling;
(3) Allocate the node to the processor which allows...Structures

Early scheduling algorithms were typically designed with simplifying assumptions about the DAG and processor **network** model (Adam et al. 1974; Bruno et al. 1974; Fujii et al. 1969; Gabow 1982...labels 1, 2, ..., j - 1 have been assigned. Let S be the set of unassigned **nodes** with no unlabeled successors. **Select** an element of S to be assigned label j as follows. For each node x...

...In an interval-ordered DAG, two nodes are precedence-related if and only if the **nodes** can be mapped to **non - overlapping** intervals on the real line (Fishburn 1985). An example of an interval-ordered DAG is... improvement of CP/MISF over HLFET is that when assigning priorities, ties are broken by **selecting** the **node** with a larger number of immediate successors.

In a recent study, Shirazi et al. (1990...all entry nodes. Compute b-level for each node. Set t-level for each ready **node** .

Repeat

(2) If the **head** of L, (n.sub.i), is a node on the DS, zeroing the edge between...

...sub.i) is minimized. If no zeroing is accepted, the node remains in a single **node** cluster.

(3) If the **head** of L, (n.sub.i), is not a node on the DS, zeroing the edge...6.3.5 The MD Algorithm. The MD (Mobility Directed) algorithm (Wu and Gajski 1990) **selects** a **node** (n.sub.i) for scheduling based on an attribute called the relative mobility, defined as...

...as unexamined. Initially, there is no cluster.

Repeat

(2) Compute the relative mobility for each **node** .

(3) Let L' be the **group** of unexamined **nodes** with the minimum relative mobility. Let (n.sub.i) be a node in L' that...Hwang et al. 1989) computes, at each step, the earliest start-times for all ready **nodes** and then **selects** the one with the smallest start-time. Here, the earliest start-time of a node...

...pair that gives the earliest time using the non-insertion approach. Ties are broken by **selecting** the **node** with a higher static b-level. Schedule the node to the corresponding processor.

(4) Add...the DL of every node-processor pair by subtracting the earliest start-time from the **node** 's static b-level.

(4) **Select** the **node** -processor pair that gives the largest DL. Schedule the node to the corresponding processor.

(5...optimal merging algorithm. This transformation step is crucial and is done as follows. For each **node** , a successor **node** is **selected** to be scheduled immediately after the node. Then, since the communication costs are unit, the...

...edge is needed to add between the chosen successor and the other successors. The successor **node** is so **selected** that the resulting DAG does not violate the precedence constraints of the original DAG.

Pande...

...the earliest start-times and latest start-times of the nodes. A threshold for a **node** is then the **difference** between its earliest and the latest start-times. A global threshold is varied between the...

...node with threshold less than the global value, a new processor is allocated for the **node** , if there is any **available** . For a **node** with threshold above the global value, the node is then scheduled to the same processor...completion time of the DAG. They also reported a technique to partition the DAGs into **nodes** with **non - overlapping** intervals so that a tighter bound is obtained. In addition, the new bounds can take...

...in this section employ a similar recursive scheduling process to minimize the start-times of **nodes** so that an **optimal** schedule results.

6.5.1 The PY Algorithm. The PY algorithm (named after Papadimitriou and...time of the child. Colin and Chretienne (1991) showed that the LWB algorithm can generate **optimal** schedules for DAGs in which **node** weights are strictly larger than any edge weight. The LWB algorithm is briefly described below...message routing issue.

6.6.1 The Message Routing Issue. In APN scheduling, a processor **network** is not necessarily fully-connected and contention for communication channels needs to be addressed. This...

...Once the header gets blocked due to link contention, the entire message waits in the **network** , occupying all the links it is traversing. Hence, it increasingly becomes important to take link...to keep the hop count of every message roughly a constant constrained by the processor **network** topology. Different **network** topologies require different channel allocation heuristics. The BU algorithm is briefly described below.

(1) Find...

...all the tasks to a single processor which has the highest connectivity in the processor **network** and is called the pivot processor. In the first phase of the algorithm, the tasks...

...times improve. This task migration process proceeds in a breadth-first order of the processor **network** in that after the migration process is complete for the first pivot processor, one of...which a task and all communications from its parents are scheduled. The priority of a **node** is modified to be the **difference** between the static level and the earliest finish-time. During the scheduling of a node...They realized that for best mapping results, a dedicated traffic scheduling algorithm that balances the **network** traffic should be used. However, traffic scheduling requires

flexible-path routing, which incurs higher overhead. Thus, they concluded that if **network** traffic is not heavy, a simpler algorithm which minimizes total **network** traffic can be used. The algorithm they used is a heuristic algorithm designed by Hanan...

...has about the same load. To take care of the topology of the underlying processor **network** , the graph of merged clusters are then mapped to the **network** topology using Bokhari's algorithm.

Yang et al. (1993) reported an algorithm for mapping cluster...since the user program is compiled into a parallel program for the iPSC/2 hypercube **computer** using parallel code synthesis and **optimization** techniques. The tool also generates performance estimates including execution time, communication and suspension times for each processor as well as **network** delay for each communication channel. Scheduling is done using the MD algorithm or the MCP...program development facilities.

8. NEW IDEAS AND RESEARCH TRENDS

With the advancements in processors and **networking** hardware technologies, parallel processing can be accomplished in a wide spectrum of platforms ranging from tightly-coupled MPPs to a loosely-coupled **network** of autonomous workstations. Designing an algorithm for such diverse platforms makes the scheduling problem even...
...program and multiprocessor models such as arbitrary computation and communication weights, link contention, and processor **network** topology.

It is clear that the above mentioned goals are conflicting and thus pose a...

...a DAG to a limited number of fully connected processors with a contention-free communication **network** . In their scheme, each solution or schedule is encoded as a chromosome containing v alleles...considerations such as a limited number of processors, link contention, heterogeneity of processors, and processor **network** topology. As a result, the algorithm is useful for distributed systems including clusters of workstations...

...experiments using extensive variations of input parameters including graph types, graph sizes, CCRs, and target **network** topologies. Comparisons with three other APN scheduling algorithms have also been made. Based on the...

...computing platforms. Heterogeneous computing (HC), using physically distributed diverse machines connected via a high-speed **network** for solving complex applications, is likely to dominate the next era of high-performance computing. One class of HC environment is a suite of sequential machines known as a **network** of workstations (NOWs). Another class, known as the distributed heterogeneous supercomputing system (DHSS), is a...to perform an application that has diverse execution requirements. Due to the latest advances in **networking** technologies, HC is likely to flourish in the near future.

The goal of HC using...

...denoting the amount of communication time required. The target multiprocessor systems is modeled as a **network** of processing elements (PEs), each of which comprises a processor and a local memory unit...

...bounded number of processors) scheduling, the TDB (task duplication based) scheduling, and APN (arbitrary processor **network**) scheduling. Analytical results as well as scheduling examples have been shown to illustrate the functionality...for scheduling task graphs on parallel processors. In International Symposium on Parallel Architectures, Algorithms, and **Networks** (June), 207-213.

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SUMICHRAST, R. T...

19991201

21/3,K/48   (Item 7 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

05464699   SUPPLIER NUMBER: 11356949   (USE FORMAT 7 OR 9 FOR FULL TEXT)
Multiserver network **operating systems. (Microsoft Corp.'s** LAN **Manager 2.0, Novell Inc.'s NetWare 3.11 and NetWare 2.2) (Software Review) (includes related articles on overall evaluation, on ease of learning, on versatility, on performance and on operating system performance) (evaluation)**
PC User, n167, p144(8)
Sept 11, 1991
DOCUMENT TYPE: evaluation   ISSN: 0263-5720   LANGUAGE: ENGLISH
RECORD TYPE: FULLTEXT; ABSTRACT
WORD COUNT: 5656   LINE COUNT: 00514

Multiserver network **operating systems. (Microsoft Corp.'s** LAN **Manager 2.0, Novell Inc.'s NetWare 3.11 and NetWare 2.2) (Software Review...**

ABSTRACT: Microsoft Corp's **LAN** Manager 2.0 and Novell Inc's NetWare 3.11 and 2.2 are market-leading **network** operating systems. US consultancy, NSTL details its extensive tests on the three products and includes...

...also covered, as well as naming services, server connection methods, backbones, bridging and routing, remote **server** connectivity products and **management** , and additional features. Overall, NetWare was considered the **best** choice for multiple **server** **networking** environments.

... system NetWare/386 3.11; Processor 80386

Strengths

* High-performance dedicated fileserver operating system
* Broad **LAN** adaptor support
* Simple workstation installation; fast shell updates
* Strong print queue management
* Excellent remote management features

Weaknesses

* Relatively expensive
* Lacks memory protection and pre-emptive scheduling
* No global naming of **network** objects
* NetWare Naming Service must be bought separately
* Users require multiple login IDs across domains

Star Rating ****

LAN MANAGER 2.0

* Price 795 pounds Five users; 795 pounds 10 users; 4,375 pounds...

...80286, 80386, 80486

Strengths

* Domain-based naming system
* Uses high-performance 320bit HPFS
* Very fast **network** protocols
* Allows sub-administrators
* Remote **server** **management**

Weaknesses

* No global naming (multidomain) of **network** objects
* Performance tuning difficult to learn
* Requires primary domain controller
* No system or group login...

...Processor 80286, 80386, 80486

Strengths

* Easy to use

* High-performance dedicated fileserver operating system
* Broadest **LAN** adaptor support
* Macintosh support is standard
* Supports internal bridging and routing

Weaknesses

* Separate domain-based naming system
* Lacks memory protection and pre-emptive scheduling
* No global naming of **network** objects
* Changing server configuration is time-consuming
* Users require multiple login IDs across domains

Star Rating ***

NSTL evaluates operating systems using the three leading high-end **networking** technologies; all support IBM 16/4 Token Ring adaptors. Novell has the largest share in...

...NetWare products have extensive features, connectivity options and support for third-party applications.

Once a **LAN** is installed and configured, its reliability, functions and performance become the key concerns, but much...

...on installation and configuration, which can be frustrating and very costly.

INSTALLATION AND
CONFIGURATION

Microsoft **LAN** Manager

Microsoft recommends installing **LAN** Manager 2.0 on top of OS/2 Standard Edition 1.3, although it works with version 1.2 using corrective service disk level XR04053 and above. (**LAN** Manager 2.0 doesn't install on top of Extended Edition 1.3.) First-time **LAN** Manager installers will often encounter problems, even when they follow documentation closely.

LAN Manager automatically replaces HPFS with HPFS386 if an HPFS partition is defined under OS/2...

...over HPFS. Local server security can be defined under HPFS386 to prevent user access to **network** files from the server (a security problem in earlier versions of **LAN** **Manager** and in the current LAN Server, which permit non-dedicated **servers**).

LAN **Manager** requires the Protectonly=Yes parameter in the CONFIG.SYS when running HPFS386, preventing local users from running DOS application in a DOS box. NetWare 3.11 doesn't support **non** -dedicated **servers** .

LAN **Manager** installers can choose user-level or share-level security. With user-level security, each user has a login ID and password, with specific rights to **network** resources. Share-level security assigns a password to each **network** resource and is rarely used. The LANMAN.INI parameter file in **LAN** Manager is intimidating, but must eventually be dealt with to boost performance above **specific** user, **workstation** or session limits. This INI file may force administrators to a higher level of complexity..:

...installation is painless except for a few documentation glitches. The most difficult step is defining **network** adaptors and their protocol bindings. Once installed, NetWare 3.11 or 2.2 require little...

...first-time installers.

MULTISERVER
CONFIGURATION

After planning and installing the physical components of a multiserver **network** , which means servers, workstations, adaptors and cabling systems, the logical configuration of the physical **network** is

critically important to **network** administration and performance. Multiserver installations of **LAN** Manager and NetWare are significantly improved by the use of domains. Domains and organizations represent **groupings** of **servers** , **workstations** , users and related resources.

Microsoft and Novell's new NetWare Naming Service (NNS) uses domains ...

...to all installations, even a single server, and multiple domains can be defined on a **network** . With a single login, users can access resources on multiple servers within a domain. In non-domain **networks** such as NetWare without the NetWare Naming Service, multiple logins must be maintained for access...

...manager several different login IDs for administrators and for users needing to cross domain boundaries.

LAN Manager

Microsoft **LAN** Manager domains can contain four types of **servers** : a primary domain **controller** , a backup domain **controller** , a **member server** and a stand-alone **server** . Primary domain **controllers** hold the primary user accounts database and validate user logins within the domain. The NET...passwords and group information.

The primary domain controller distributes NET.ACC to all backup and **member servers** in the domain to validate access to **server** resources. During usual operations, **LAN Manager** backup controllers can actively perform login validations to balance the login processing load. Backup or **member servers** can be changed to primary servers in the event of a system or **network** segment crash. When a primary domain controller fails, **LAN** Manager users can be validated by a backup controller.

Microsoft's Intallation Guide concludes its coverage of server installation with: "this computer is now installed as a stand-alone **server not participating** in domain-wide security." After searching the Administrator's Guide or calling Microsoft, installers will eventually figure out how to set up the **server** properly. Setting up backup or **member servers** can test the installer's resolve, and NSTL recommends that users follow documentation to the...

...no explicit roles for multiple NetWare servers with or without the NetWare Naming Service. All **servers** are peers, and administrators **control** user access to multiple **servers** . Without NNS, users must explicitly log in to each server, where their user names and...

...single user ID for use on all servers; users then use one password for all **servers** and place an Attach **command** for each **server** in their login scripts.

Users logging into the first server would then automatically be logged...

...Although cumbersome, this works.

NetWare Naming Service improves the installation and maintenance of multiple server **networks** by introducing the domain concept (see Naming Services). NNS makes the administration of groups and...
...in the domain and improves printer queue access. NNS installs on a server from a **network** workstation using five installation disks. Large **networks** require planning of domains, groups, users and login scripts. Layering NNS over existing NetWare **networks** can result in name conflicts between old NetWare servers and the existing NNS domain.

Server...

...must be loaded from floppy disks.

Multiple server installations within a company are easier when

network files can be loaded from another server's hard disk. NetWare can upload server operating system files to the **network** and download the files to a prospective **server** .

WORKSTATION

INSTALLATION

LAN Manager

LAN Manager supports DOS and OS/2 **workstations** , and its remote boot facility supports diskettes OS/2 and DOS workstations. **LAN** Server currently provides remote booting only for DOS Requester stations; it doesn't support Macintosh workstations, either. **LAN** Server refers to **network** workstations as Requesters. The workstations-based LANMAN.INI file may require manual modifications.

The menu-based installation automatically modifies basic parameters. **LAN Manager** DOS **workstations** can be set up in Enhanced or Basic modes. Enhanced mode provides Named Pipes (interprocess communications) support, an extended **network** command set, the **LAN** Manager interface screen, messaging to **LAN** users and the ability to define user profiles. Basic workstations use less memory, have fewer **network** commands and don't include the **LAN** Manager interface screen, messaging or Named Pipes support.

Both modes can use HIMEM.SYS to load portions of the **network** redirector into high memory to free lower memory.

The Enhanced mode installation script provides a...

...have all the functionality of Enhanced mode DOS stations, plus peer-to-peer configuration capacibility.

LAN Manager 's Peer Service permits limited **server** functions on OS/2 workstations, such as sharing of file, print and communication devices. More...

...their Named Pipes support is unlimited. Users don't need to buy another copy of **LAN Manager server** software to install an SQL server.

NetWare

NetWare 2.2 and 3.11 support DOS...

...is fast and easy to use. IPX packet sizes can be altered, depending on the **network** adaptor's capabilities. The DOS Open Data-Link Interface workstation software included with both NetWare...

...XMSNETx or EMSNETx redirectors. NetWare 3.11's Requester for OS/2 connects OS/2 **workstations** .

Earlier limitations on **Named** Pipes have been increased to 255, and support has been added for HPFS extended attributes and long names.

Naming services

Network naming services are important for the easy administration of multiserver **networks** . Naming services let administrators assign names to physical **network** resources, such as print queues and disk directories, and to individual and groups of users...

...manage user login names and permissions, and it simplifies user login procedures and access to **network** resources.

Domain are essential to naming service implementations. None of the naming systems currently comply with CCITT X.500 directory service standards.

LAN Manager

Microsoft uses a two-part naming system. One component manages user names and logins within a domain, and the other allows the specification of **network** resources such as directories and print queues. Users log into a domain with a userGroups exist only as administrative tools for setting up access permissions. **Network** resources such as printers and file services are referenced using the \\computername\sharename method.

Microsoft provides a reasonable **network** interface shell (a menu **selection** of **server** resources) which effectively shields beginners from command-line parameters. Users are defined with a user name, computer name and domain name. Computer names must be unique across the **internetwork** including across multiple domains, because NetBIOS demands unique computer names to establish communication sessions. Neither...

...domain operations.

Because domains don't exchange naming database information, a complete view of the **network** is available to all users without additional administrative actions. Administrators must set up different user...

...in an NNS database. Profiles are group-level login scripts that allow up to eight **server** connections.

Like the **LAN Manager** and **LAN Server** domain naming schemes, NNS doesn't encompass all **network** resources, such as file services. NNS facilitates management of groups of users and noticeably improves...
...administrator can manually invoke a synchronisation. Novell recommends that synchronisation be initiated from a 'template' **server designated** to hold the 'most accurate' copy of the NNS database, and that all domain changes...

...login. The domain login script is similar to the system login script of non-NNS **networks** , and applies to all users in a domain. Domain login scripts include greetings, announcements and...

...to managing groups and users. Profile login scripts, executed after the domain login script, attach **groups** of users to **particular servers** and set up their environment and search drives.

User login scripts are executed after profile...

...creation and management selections; Attach now attaches users to domains; Slist lists domains on the **internetwork** ; and Whoami lists attached servers and corresponding domains. Login, Logout, Pconsole Nprint, Makeuser, Setpass and...

...methods are governed by a number of factors, including server hardware, server locations, wiring choices, **network** operating system bridging capabilities, cable restrictions and physical obstructions, security issues, link redundancy, **network** traffic levels, number of **servers** , telecommunications circuit **availability** and cost restraints. The optimum setup is often accomplished only with experience and time.

Backbones...

...of servers at a single building site are often physically attached to the same local **network** with all **network** traffic travelling on the same wire. Server backbones improve performance by preventing traffic on one segment from crossing to another segment unless **specifically** destined for that segment.

Novell **servers** are intrinsically capable of supporting a backbone **network** using multiple cards in each server, for example, with one dedicated to backbone communications and the other(s) connected to attached **network** segments. Because **LAN** Manager systems don't support internal bridging, backbone configurations must be accomplished externally. External bridging costs more than internal bridging, but performance is far better.

Bridging and routing

Novell **networks** provide routing functions between **network** adaptors in a server. A NetWare workstations can act as an external router for added...

...can be created on NetWare 2.2 or 3.11 workstations.

Routers exist at the **Network** layer of the OSI model and are inherently more intelligent than bridges (at the Link layer) in managing communications between multiple **network** segments or geographically dispersed LANs. When multiple paths are available between LANs, routers base path...

...or pre-defined transmission cost criteria.

The complex task of choosing a Link-layer bridge, **Network** -layer router, routing bridge or bridging router depends on traffic volume, link costs, transmission facilities, protocol support and overall **network** delay factors. All the **network** operating systems can be used with third-party bridges to improve **network** design and performance.

Third-party routers can co-exist with NetWare 386 routers, provided the third-party routers are built to operate with underlying **network** operating system protocols. **LAN** Manager **networks** rely on third-party bridges or routers to connect disparate **network** segments. Connection of different **LAN** Manager **network** segments running on Token Ring adaptors requires source-routing Token Ring bridges.

Novell **networks** can communicate across source-routing Token Ring bridges when source-routing drivers are enabled. NetWare...

...NetWare 3.11 free of charge. The Async Remote Router installs in a server or **network** workstation (2.1x and higher) and enables the use of COM ports with a throughput of up to 2,400bps (workstations) or Wide Area **Network** Interface Module (WNIM adaptor) ports up to 19.2Kbps (server or workstations).

Each WNIM contains four ports. Two WNIM adaptors can be installed in a **network** workstations router and one WNIM in a server. Novell recommends installing the asynchronous routing function in a **network** workstation to prevent compromising server performance or reliability. Internal Async Remote Routers can't be...

...files are dated November 1989. Link/X.25 installs only as an external router in **network** workstations. Link/T1 and Link/64 can be installed as internal routers in NetWare 2...

...common hardware and software installation problems, performance issues and 'known compatible' third-party products.

Remote **server** **management**

All three test systems support some form of **server** **management** from **workstations** . NetWare 2.2 administrators can use Fconsole to view server disk and link statistics, take down fileservers and purge files. NetWare 3.11's more powerful Remote **Management** Facility (RMF) allows remote **server** console operation.

Standard utilities such as Syscon and Netcon (with NNS) manage multiple server resources and users from **network** workstations. NetWare RMF is the most powerful remote management facility tested. Given the proper files in the server and workstation, RMF can establish synchronous or asynchronous remote **management** connections to a **server** .

RMF enables execution of **server** console **commands** from **workstations** , file transfers between the workstation and server directories, modification of server start-up and AUTOEXEC.BAT files, rebooting of fileservers, servers operating system upgrades and even remote **server** installation. **LAN** Manager permits remote **server** administration using the Net Admin **command** from a **network** **workstation** . Net Admin focuses on a **specific** **server** and enables standard resource and user management functions.

Other features

The NSTL feature charts compare and contrast operating system features which address the multifaceted nature of multiserver **networks** .

Businesses should consider backup services, server link security, resource assignment across multiple servers using login...

...data and password encryption, security, application toolkits, host connectivity auditing features, distribution of print services, **network** protocol support, file system support, performance monitoring tools and **network** management compatibility and options.

OVERALL EVALUATION

NetWare is the **best** choice for multiple **server** **networking** . The NetWare products provide the strongest sets of features, but for more than 100 users, NetWare 3.11 is expensive. The NetWare Naming Service adds key functionality for multiple server **networks** .

Although it improves on NetWare 2.1x methods, NetWare 2.2 still lacks the usability of NetWare 3.11. NetWare 3.11's multiserver **network** performance is hampered when IPX packets larger than 512 bytes are sent through an internal...

...features in NetWare 3.11 may appeal to large businesses, universities and government agencies.

Microsoft **LAN** Manager 2.0 is far better than earlier divisions and priced to sell, but it's still lacking in usability. For example, **LAN** Manager administrators must define multiple login IDs for users needing multidomain access. Performance is astoundingly fast across the **network** wire because of NetBEUI's sliding windows. General server performance is good due to enhanced...

...3 Ease of Learning

5 Ease of Use

EASE OF LEARNING

Given proper and efficient **network** administration, **network** users will find either of the systems equally easy to learn. However, inexperienced administrators may...

...fine-tuned for easy setup and learning based on user feedback; Microsoft needs to improve **LAN** Manager's ease of use and should consider options for basic and advanced installation procedures...

...out of the box.

Multiple domain administration and integration are poorly documented in NetWare and **LAN** Manager. Novell and Microsoft provide assorted quick-start tools as well as worksheets and **network** planning recommendations. Novell provides excellent Rules of Thumb documents with its server-to-server communication products which include suggested hardware and software configurations based on engineering experience.

LAN **Manager** multiple **server** set-up requirements can be difficult to understand. Defining a server's role in a...scores for the individual criteria.

Weight	Evaluation Criteria
1	Operating System Installation
2	Connecting Multiple **Servers**
3	Single Domain **Management**
3	Multiple Doman Management
1	Remote Management
1	Adaptor Installation
1	Documentation
2	Security Administration...

...systems, including OS/2 and HPFS, Macintosh and AFP, Windows, VAX/VMS,

TCP/IP using **LAN** WorkPlace for DOS or OS/2, FTAM and NFS. Multiple protocols can be used in...

...3.11 supports 250 users per server. NetWare 3.11 now offers NewView and SNMP **network** management support.

NetWare products continue to offer detailed security, accounting and auditing features, but lack substantial alert services. Both versions offer system backup and restore from **network** workstations, and NetWare 3.11 adds a server-based backup utility implemented as an NLM.

LAN Manager's user account and file system permissions rival NetWare, and **LAN** Manager can optionally use share-level security, but it doesn't support Macintosh workstations, nor...

...design advantages over the NetWare Naming Service.

Although Microsoft doesn't directly supply wide area **networking** products, the **LAN** Manager architecture supports third-party bridging and routing products. Related optional products such as Microsoft SQL Server and Microsoft Mail (**Network** Courier) strengthen **LAN** Manager's market position.

Methodology

Versatility is a weighted average of scores based on each operating system's standard and advanced **network** services. Features and their methodology weights are listed in the facing Versatility chart.

Weight	Versatility...
...0	Share-Level Permissions
4	User Account Permissions
2	User Utilities
2	Administrative Utilities
1	**Network Management** Support
2	Connectivity
4	**Server** Bridging/Remote Access
2	Accounting
2	Auditing
1	Alert Service
2	Performance Monitoring
1	Messages/Chatting
1	E-mail
2	Archival Services
2	**Network** Printing
2	Printing Queues
1	Fault Tolerance
1	Application Program Interfaces
1	Peer Resource Sharing...

...System Support

1	Miscellaneous Utilities

PERFORMANCE

In benchmarks that focus on measuring communications speeds between **network** segments using an external bridge, Microsoft **LAN** Manager's NetBEUI protocol certainly shines. Although connecting **LAN** Manager **network** segments requires external bridges or routers, NetBEUI's efficient sliding window algorithm may well be worth the added expense in some environments.

Aside from **network** wire issues, **LAN** Manager uses a newer 32-bit HPFS386 with improved cacheing capability. The lazy wire option found in the **LAN** Manager cache program improves disk write performance.

NetWare supports **network** connections using internal routers. New versions of NetWare's IPX protocol can transmit packets larger...

...workstation-based external router, which may improve overall system

performance at the expense of a **network** workstation.

Methodology

Performance tests measure **network** operating system speed using two **LAN** segments bridged with external and internal bridges. Tests are conducted with and without traffic. All...

...1 Sequential Write from Cache

OPERATING SYSTEM PERFORMANCE

Test configuration

The NSTL performance tests measure **network** operating system performance characteristics with two servers operating on different Token Ring **network** segments.

Each Token Ring **network** segment includes a server and five workstations using IBM 16/4 Token Ring Adaptors running using two **network** adapters in each server, and an external bridge. The backbone uses a separate MAU.

LAN Manager can connect different **network** segments only through external bridges or routers. NetWare is capable of internal bridging and routing. All three **network** operating systems are tested through an external bridge, and NetWare is also tested with internal bridging.

Testing with two configurations helps determine which **network** operating system is the **most** **efficient** at managing communications over the **server** links.

Four 16MHz 386SX traffic workstations and one 33MHz 386 superstation re attached to each...

...assigned tasks (loading and saving of data from the opposite server).

The traffic workstations generate **network** traffic to the opposite server. Tests are run several times and averaged.

External Bridging

External...

...source routing bridge which is compatible with IEEE 802.5 and IBM source routing protocols.

LAN Managers uses source routing fields within its protocols. NetWare doesn't use source routing fields...

...source routing drivers available from Novell were loaded according to the vendor's documentation.

For **LAN** Manager, NSTL set up two domans, each with a server, superstation and four workstations. NetWare...

...Naming System, and all servers and workstations were defined within the domain.

NSTL also tested **LAN** **Manager** with two **servers** residing in one domain, and observed no difference in performance. A **Network** General Sniffer running its Token Ring 16/4 analysis package was used to analyse **network** traffic and ensure that performance parameters were set up properly.

A **Network** General Token Ring Monitor was also used, in order to characterise **network** traffic generated by the **network** operating systems.

The performance results show that a dedicated bridge is much faster than internal bridging/routing of **network** traffic. Different operations and different data request sizes contributed to significant differences between the systems.

Performance tuning

LAN Manager's automatic performance tuning feature isn't well documented, but it can be selected...

...other factors.

NetWare 3.11's automatic tuning feature adapts or self-tunes based on **network** usage. NSTL attempted to set up 4Kb transmit and receive buffers at the MAC level for the **network** operating systems. **LAN** Manager is throttled to 2Kb packets across the wire, which Microsoft acknowledges is the product's limit.

LAN Manager request buffers at the operating system level are still set to 4Kb. NetWare permits...

...cache size and individual cache buffer sizes were left at the defaults for NetWare and **LAN** Manager; lazy writes were enabled in **LAN** Manager.

NSTL kept NetWare 3.11's Write Verify=ON default, which had a nominal ...

...parameter mix, due to the variety of processing scenarios. NetWare is easier to tune than **LAN** Manager.

CAPTIONS: Summary. (graph); Netware 3.11. (table); **LAN** Manager 2.0. (table)

DESCRIPTORS: **Network** operating systems...

TRADE NAMES: **LAN** Manager 2.0 (**Network** operating system...

...NetWare 3.11 (**Network** operating system...

...NetWare 2.2 (**Network** operating system...

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21/3,K/79 (Item 1 from file: 647)
DIALOG(R)File 647:CMP Computer Fulltext

01211017 CMP ACCESSION NUMBER: NWC20000306S0020
Win2000 Server: Proceed With Caution - Although Windows 2000's Server and Advanced Server versions have compelling new features, they offer few, if any, performance advantages over Windows NT 4.0.
Ron Anderson
NETWORK COMPUTING, **2000** , n 1104, PG46
PUBLICATION DATE: 000306
JOURNAL CODE: NWC LANGUAGE: English
RECORD TYPE: Fulltext
SECTION HEADING: Analysis - Windows 2000
WORD COUNT: 2523

, **2000**
... performance is not an indicator for upgrading to Windows 2000.

Windows 2000 Server and Advanced **Server** are virtually identical products; the **difference** between the two is the level of support. Windows 2000 Server supports four-way SMP...

...NT Enterprise Edition's 4-GB limit). Advanced Server also supports 32-node TCP/IP **network** load-balancing, and has two- **node** **server** clustering for high **availability** . Both packages include Terminal Services, but client-access licenses must be purchased separately. A 25-user Server license costs $1,799; a 25-user Advanced **Server** license, $3,999.

The physical **specifications** for 2000 **Server** are nearly the same as they are for NT **Server** ; ditto for the **specifications** for 2000 Advanced **Server** compared with NT Server Enterprise Edition. The most compelling reasons to consider the move to...

...to log on to an Active Directory domain via a cable- modem connection to the **Internet** , but hadn't yet set up the remote- access service. Using Terminal Services, we connected to the domain controller, set up remote access, and had a VPN (virtual private **network**) logon to Active Directory within five minutes. This is good stuff.

Terminal Services is one of the IP-based services that can take advantage of Advanced Server's **network** load-balancing. You can establish a server farm of up to 32 Terminal Services servers that are accessible via a single IP address. **Network** load-balancing plugs new sessions into the server with the lightest load. **Internet** Information Server (IIS) as well as other TCP- and UDP-based applications also will benefit...

...on a notebook is nirvana. Our portables went from docked to undocked and from wired **Ethernet** to wireless **networking** without missing a beat or a packet. Power management worked like a charm, as did...

...Adding greatly to the manageability matrix when Active Directory and Windows 2000 are paired are **computer** and user **group** policies for **management** ; application installation and maintenance; offline folders for mobile workers; and RIS (Remote Installation Services) ...can use the same image to install the OS via RIS-even if the video, **network** and disk drivers are different. RIS lets you know early on if the image you...

...access to their computers and a variety of OS features, and redirect

user folders to **network** storage.

Microsoft Active Directory

Active Directory has the potential to be the farthest-reaching component...

...one in Wisconsin and one in Washington. The systems were connected via a frame relay **network** . Unlike our experience with an early build of Windows 2000 (back when it was still NT 5.0-see "NT 5.0 Testing: Nice Faucets, Lousy Plumbing, " www. **networkcomputing** .com/921/921f13.html), the connections among our sites were easy to establish and worked...

...different types of replicas, opting for multimaster replication instead. Forget about managing access rights to **network** resources at the OU (organizational unit) level, too; Active Directory supports only users or groups...JavaBeans, see " Sneaking Up on CORBA: The Race for the Ideal Distributed Object Model, " www. **networkcomputing** .com/1009/1009f2.html). Microsoft is working toward simplifying the development and deployment of COM...

...1.

With these additions, Microsoft has stated that it intends Windows 2000 to be "the **best** application **server** in the world." If the company is even marginally successful, independent application-server vendors are ...

```
Set      Items   Description
S1           0   AU=(SAMPATHKUMAR G? OR SAMPATHKUMAR, G?)
S2           0   GOVIND?(2N)SAMPATHKUMAR
? show files
File   2:INSPEC 1969-2005/Apr W4
         (c) 2005 Institution of Electrical Engineers
File   6:NTIS 1964-2005/May W1
         (c) 2005 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2005/May W1
         (c) 2005 Elsevier Eng.  Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2005/May W2
         (c) 2005 Inst for Sci Info
File  35:Dissertation Abs Online 1861-2005/Apr
         (c) 2005 ProQuest Info&Learning
File  62:SPIN(R) 1975-2005/Feb W4
         (c) 2005 American Institute of Physics
File  65:Inside Conferences 1993-2005/May W2
         (c) 2005 BLDSC all rts. reserv.
File  94:JICST-EPlus 1985-2005/Mar W3
         (c)2005 Japan Science and Tech Corp(JST)
File  95:TEME-Technology & Management 1989-2005/Apr W1
         (c) 2005 FIZ TECHNIK
File  99:Wilson Appl. Sci & Tech Abs 1983-2005/Apr
         (c) 2005 The HW Wilson Co.
File 111:TGG Natl.Newspaper Index(SM) 1979-2005/May 12
         (c) 2005 The Gale Group
File 144:Pascal 1973-2005/May W1
         (c) 2005 INIST/CNRS
File 256:TecInfoSource 82-2005/Mar
         (c) 2005 Info.Sources Inc
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
?
```

```
Set      Items   Description
S1           0   AU=(SAMPATHKUMAR G? OR SAMPATHKUMAR, G?)
S2           0   GOVIND?(2N)SAMPATHKUMAR
? show files
File   9:Business & Industry(R) Jul/1994-2005/May 12
         (c) 2005  The Gale Group
File  13:BAMP 2005/May W1
         (c) 2005  The Gale Group
File  15:ABI/Inform(R) 1971-2005/May 12
         (c) 2005 ProQuest Info&Learning
File  16:Gale Group PROMT(R) 1990-2005/May 12
         (c) 2005 The Gale Group
File  20:Dialog Global Reporter 1997-2005/May 13
         (c) 2005 The Dialog Corp.
File  47:Gale Group Magazine DB(TM) 1959-2005/May 13
         (c) 2005 The Gale group
File  75:TGG Management Contents(R) 86-2005/May W1
         (c) 2005 The Gale Group
File  88:Gale Group Business A.R.T.S. 1976-2005/May 12
         (c) 2005 The Gale Group
File  98:General Sci Abs/Full-Text 1984-2004/Dec
         (c) 2005 The HW Wilson Co.
File 141:Readers Guide 1983-2005/Dec
         (c) 2005 The HW Wilson Co
File 148:Gale Group Trade & Industry DB 1976-2005/May 13
         (c)2005 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 239:Mathsci 1940-2005/Jun
         (c) 2005 American Mathematical Society
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File 810:Business Wire 1986-1999/Feb 28

File 813:PR Newswire 1987-1999/Apr 30

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